CANADA AT THE CROSSROADS

THE REALITY OF A NEW COMPETITIVE ENVIRONMENT

MICHAEL E. PORTER AND
THE MONITOR COMPANY

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President and Chief Executive
Business Council on National Issues
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The Honourable Michael Wilson, P.C., M.P.
Minister of Industry, Science and Technology
and International Trade
Government of Canada

Gentlemen:

On behalf of ourselves, a team of dedicated and talented Canadians from Monitor Company, and other able collaborators, we are pleased to present to the Business Council on National Issues and the Government of Canada our final report, CANADA AT THE CROSSROADS – THE REALITY OF A NEW COMPETITIVE ENVIRONMENT.

A great number of Canadians have assisted us in preparing this study. Without their openness, insights and commitment, our task would have been impossible. We are grateful to them and to the generosity of the Business Council on National Issues and the Government of Canada for the financial support that made this study possible.

The findings and implications drawn in this study are ours and ours alone. While we have drawn heavily from Canadian economic literature and benefited greatly from comments and criticism by many, our independence was a condition of undertaking this study. The funding you have provided has allowed the Monitor team to defray its costs, but was not intended to produce a profit. Professor Porter contributed his time to the study without compensation.

We trust that our analysis and findings will be helpful to decision-makers in all the constituencies in Canada concerned with building a more prosperous and competitive country. We know that a number of our conclusions may make some uncomfortable, but we advance them in a constructive spirit. Our aim is to inform and catalyze a debate which will benefit Canada.

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Canada at the Crossroads is an independent research project and the findings and conclusions are those of the authors alone. A study of this magnitude would not have been possible, however, without the support and counsel of a dedicated group of external advisors. The project benefited greatly from the generous input and insight provided by a group of Canadians whose knowledge of the Canadian economy -- and the public policies that have helped shape it -- are truly substantial.

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The many contributors to this project all shared a common goal, to inform and stimulate a constructive dialogue about Canada's economic future. That so many Canadians have given so generously of their time is both a tribute to their commitment to Canada and a real sign that constructive change is possible.

CANADA AT THE CROSSROADS: THE REALITY OF A NEW COMPETITIVE ENVIRONMENT

MICHAEL E. PORTER MONITOR COMPANY

OCTOBER 1991

PART I

CANADA AND INTERNATIONAL COMPETITION: THEORY AND EVIDENCE

CHAPTER 1

SETTING THE CONTEXT

The principal economic goal of a nation is to provide a high and rising standard of living for its citizens. By this yardstick Canada's economy has performed well over the last 30 years. It has achieved one of the world's highest standards of living while creating and maintaining a generous and socially progressive state. Adjusted for purchasing power, Canada ranked second among Organization for Economic Cooperation and Development (OECD) nations in per capita Gross Domestic Product (GDP) in 1989, up from fourth in 1960. Canada also has compared favourably with other OECD nations in terms of per capita private consumption and disposable income during this period (see Figure 1.1).

We believe, however, that Canada today is at an economic crossroads, and that the core of its economic prosperity is at risk. Canada's rich natural resource endowments, its proximity to the U.S., and a history of insulation from international competition have combined to allow Canadian industry to achieve an enviable economic performance. These same advantages, however, have led to an array of policies, strategies and attitudes on the part of governments, business, labour and individual Canadians that leave the economy in many respects ill equipped to respond to a rapidly changing competitive environment.

Canadian industry is currently undergoing a rapid structural change. Signs are already accumulating that Canadian industry is encountering difficulties as it confronts this changed and more competitive environment. If the current trajectory continues, the standard of living of Canadians seems destined to fall behind. Yet there is nothing inevitable about this outcome; Canadians have in their own hands the power to change it.

Figure 1.1

PER CAPITA RANKING AMONG SELECTED OECD COUNTRIES

COUNTRY	GDP PER CAPITA		PRIVATE CONSUMPTION PER CAPITA		NATIONAL DISPOSABLE INCOME PER CAPITA	
	1960	1989	1960	1989	1960	1989
Canada	4	2	4	2	5	4
U.S.	1	1	1	1	1	2
Japan	21	8	21	7	21	7
Germany	11	10	12	14	11	9
U.K.	7	13	5	6	6	11
Italy	18	18	18	11	18	15
Sweden	6	7	8	15	7	8
France	14	11	15	8	13	10

Note: 1. Indicators are based on constant prices in US$ using 1985 Purchasing Power Parity exchange rates
2. Ranking based on 24 OECD countries

SOURCE: OECD; NATIONAL ACCOUNTS

1. THREATS TO PROSPERITY

The underpinning of a nation's standard of living is productivity, which is the value of output produced by a day of work or a dollar of capital invested. In the long run, productivity is the most important determinant of a nation's standard of living. Labour productivity sets wages, while the productivity of capital determines the return to its holders. These two are the major sources of national income. High and rising levels of productivity allow citizens to improve their material well-being. It also holds the key to a nation's ability to meet its social goals. Productivity creates the resources necessary for expenditures on infrastructure and other public services, as well as the ability to provide a safety net for society's less fortunate. A productive industrial base is also more able to respond to regulations in areas of social concern, such as the environment and workplace safety.

Sustained productivity growth requires that an economy continually upgrade itself. This is the essential test by which a nation's competitiveness must be measured. An upgrading economy is one that competes in increasingly sophisticated ways. Existing industries relentlessly pursue higher productivity through improved products and more efficient production processes. Firms have the capability to move into more sophisticated industry segments and compete in entirely new industries, absorbing the resources made available by improved productivity in existing fields. The capability of an economy to upgrade (that is, its competitive potential) depends on the underlying structural and institutional characteristics of the country itself -- for example, its workforce, its schools and its public policies. Cyclical factors, such as shifts in world commodity prices, can create the illusion of prosperity but are not reflections of changes in true competitiveness; at best, they yield only temporary advantages.

A. Canada's Industrial History

Canada has achieved high levels of productivity and national wealth as a result of what we call the old economic order. It was built on the foundation of striking advantages in natural endowments, preferred access to the large, productive U.S. economy as both a market and a source of investment, a history of market protection and limited internal competition. The old economic order produced a set of internally consistent conditions in the Canadian economy, including reinforcing government policies, company strategies, labour approaches and institutional structures. It became deeply imprinted in the attitudes and traditions of Canadians in all parts of the economic system.

This old economic order was a system where everyone was behaving rationally. Business, labour, and government had adapted to the environment they faced. It was a system that was sustainable given Canada's position in the international marketplace. The old economic order was also one in which many prospered. Business earned high profits, labour earned high wages, government had ample resources to meet an ambitious social agenda, and ordinary citizens generally enjoyed a high standard of living.

That Canada's success has been grounded on a limited set of advantages, stemming largely from abundant natural resources, is certainly not a new idea. Indeed, warnings have been sounded for many years. As the Royal Commission on Canada's Economic Prospects noted in 1957:

> Canadians must guard against overrating the strength of their position in forest and mineral products; for most of such commodities, there are many closely competitive sources in other parts of the world.[1]

Until recently, these fears have been overstated. The Canadian economy could maintain an equilibrium -- based on the sheer magnitude and quality of its resources, combined with a sheltered market -- without a reduction in the Canadian standard of living.

We believe, however, that the current situation is different. Increasing globalization of trade and investment, accelerating technological changes, rapidly evolving company and country strategies, and -- more recently -- the Free Trade Agreement with the U.S., represent significant discontinuities in the nature of international competition confronting Canadian-based industry. Together, these forces are disintegrating the old order. It is no longer internally consistent or sustainable.

Canada already is in the midst of a major structural adjustment as a result of these forces. The question is not whether there will be an adjustment, but what the nature of that adjustment will be. A positive response would be to upgrade the sophistication of Canadian industry. A negative response would be a long-term decline in wages and profits: a collective salary cut.

The disintegration of the old order would not be a problem if Canadian industry could readily adapt to the new competitive reality. The problem, as we see it, is that the old order has left a legacy. It has resulted in numerous policies, strategies, attitudes and mindsets that are impeding the ability of the economy to adjust in a positive way. There are significant barriers to upgrading in Canadian industry that will make the move to more sophisticated competitive advantages difficult. These barriers exist in such fundamental areas as science, technology, education and training, among others. Because the old order provided insulation from external pressures and fostered limited internal pressure, many of the critical requirements for upgrading in Canadian industry are lacking or are only weakly present.

For Canada, with its extensive trading relationship with the U.S., as well as an unusually high degree of foreign ownership, this shifting character of international competition raises challenges that are particularly urgent. As we discuss in detail later, both Canadian and foreign companies are in the process of determining how to reconfigure their North American and international activities, and deciding where to locate what we term "home bases" for individual product lines and even the entire company. These home bases -- locations where strategic control lies, core research and development (R&D) is performed and sophisticated production is undertaken -- are where the best jobs normally reside and where the most beneficial spillovers to other industries in the economy occur. The presence of home bases is crucial to an economy because they support high productivity and productivity growth. Unless significant changes are made, Canada is in danger of losing its capacity to attract and retain both foreign- and Canadian-owned home bases.

So far, many industries and sectors show few signs of upgrading. In addition, as we discuss below, macroeconomic indicators have begun to manifest the weaknesses that exist at the industry level. Although Canada's status as a wealthy nation is not in doubt, the risk is of a slowly eroding standard of living over the coming years.

B. Worrisome Performance Trends

Canada's historical prosperity is evident, and Canada's economy generally performed quite well during the post-1982 period. Growth in real GDP outstripped that of all G7 countries except Japan from 1983 to 1989, while employment growth was second only to the United States. Since early 1990, with the onset of recession, growth has come to a halt. Yet the severity of the 1990-91 recession is itself a sign of underlying structural problems -- including poor cost performance and inflexible labour markets.

Canada's reasonably strong output growth in the 1980s was largely attributable to strong growth in inputs, in particular a fast-growing labour force. As we will see, there was little improvement in the efficiency of use of inputs. Labour force growth will be slower in the 1990s. This means that economic growth will increasingly depend on the ability to achieve higher productivity rather than the mere presence of more workers. Yet there is mounting evidence of deficiencies in the ability of the economy to upgrade productivity in individual industries. While the past has been prosperous, the conditions that will determine Canada's future prosperity are worrisome.

I) Productivity Growth Has Been Slow

The most serious sign of Canada's long term economic problems is weak productivity growth. Although Canada's absolute level of productivity -- as measured by real GDP per employed person or per hour worked -- is second highest in the world (behind the U.S.), productivity growth has been sluggish for almost two decades. During this period, Canada has fallen behind other developed countries in its ability to increase productivity.

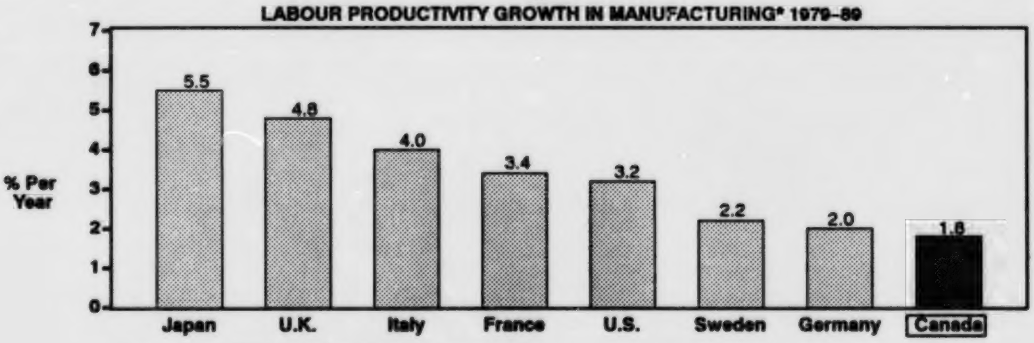
Total factor productivity (TFP) is the single best overall measure of productivity because it incorporates growth in the productivity of both labour and capital inputs. From 1973 to 1979, Canada had the third lowest business sector TFP growth among the G7 countries (0.8 percent per year). In the period 1979-89, the situation deteriorated further: Canada tied with the U.S. for last among G7 economies in business sector TFP growth, with an annual growth rate of just 0.4 percent. More recently, from 1985 to 1989, Canada's business sector failed to increase TFP at all.[2]

A similar pattern held in the case of labour productivity -- a more widely used productivity measure. From 1973 to 1979, labour productivity in Canada's business sector rose at an average annual rate of 1.5 percent, second lowest among the G7 (only in the U.S. was labour productivity growth slower). In the more recent 1979-89 period, business sector labour productivity increased at an average annual rate of 1.4 percent, which again put Canada second last among the G7 economies.3 While several of its trading partners experienced some rebound in productivity growth in the 1980s, Canada saw only a very modest improvement. As a result, Canada's productivity performance relative to other advanced economies deteriorated in the 1980s.

Productivity trends in the manufacturing sector are particularly important because in most advanced economies it is this sector that is most affected by international trade and competition. As seen in Figure 1.2, Canada had the lowest rate of productivity growth in the manufacturing sector of all G7 countries during the 1979-89 period. Productivity growth in services has also been relatively low, with a 1.0 percent annual increase over the same period.

Figure 1.2

LABOUR PRODUCTIVITY GROWTH IN MANUFACTURING* 1979-89



Note: * Growth in real output per hour in manufacturing
National Currency Basis
SOURCE: U.S. BUREAU OF LABOR STATISTICS

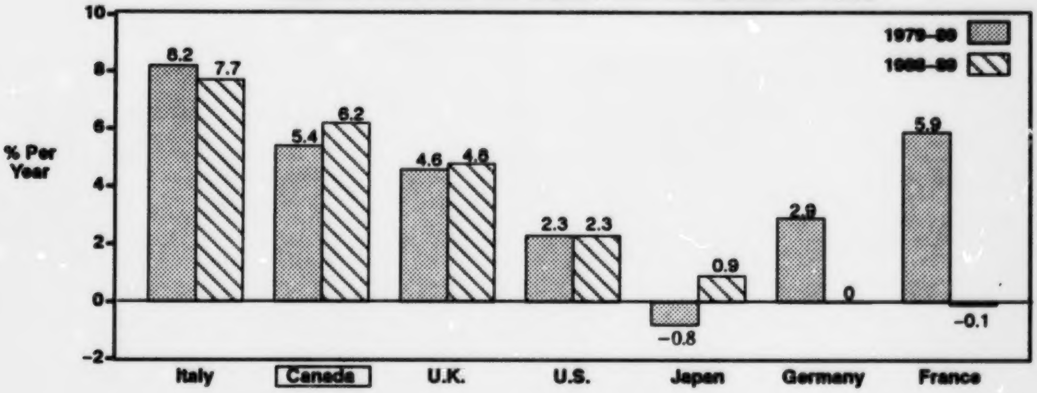
Since productivity is the critical determinant of real income growth over the long term, it is not surprising that Canada has experienced very weak growth in real incomes and wages in recent years. In contrast to previous decades, the average Canadian family experienced essentially no gain in real, after-tax income in the 1980s: average after-tax family income was $40,400 in 1989, compared to $40,200 in 1980 (in 1989 dollars). This evidence underscores the linkages between competitiveness and productivity growth in the Canadian economy and the welfare of ordinary citizens.4

Explanations for Canada's deteriorating relative productivity performance vary. But there are strong reasons to believe it is linked to deeper problems in the economy, including the slow development and adoption of new technologies, and weaknesses in education systems and training practices. It is these deeper problems, and a holistic paradigm for understanding them, that will preoccupy us in subsequent chapters.

ii) Unit Labour Costs Are Rising

Canadian labour costs have been rising faster than the rate of productivity growth can sustain. Unit labour costs are defined as labour income per unit of output. When labour income per worker rises faster than output per worker, unit labour costs increase. Unit labour costs are an important measure of competitiveness. In Canada's manufacturing sector, unit labour costs grew at a rate third only to Italy and France among G7 nations in the 1980s, and rose more than twice as fast as comparable U.S. costs (see Figure 1.3).

Figure 1.3
NOMINAL GROWTH IN UNIT LABOUR COSTS IN MANUFACTURING



Note: National Currency Basis
SOURCE: U.S. BUREAU OF LABOR STATISTICS

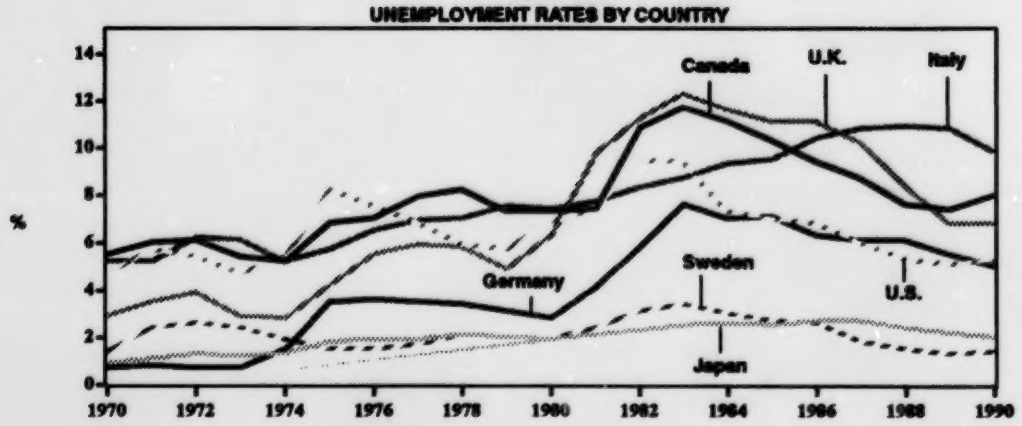
Poor unit labour cost performance reflects competitiveness problems among Canadian manufacturers which have been aggravated in recent years by the appreciation of the Canadian dollar vis-à-vis the U.S. dollar.

iii) The Secular Unemployment Trend Is Up

The ability of an economy to create jobs is a separate issue from that of productivity performance, but the two are ultimately related. Persistently high unemployment levels, growing numbers of workers with only marginal or intermittent attachments to the labour force, and the increasing average duration of unemployment all point to underlying economic problems that can affect the capacity of the nation to upgrade its economy and respond successfully to changes in technology and global markets. Canada's unemployment rate has been high in comparison to rates in most other nations, and has trended upwards for much of the last 20 years in spite of strong new job creation (see Figure 1.4). This persistently high unemployment suggests that the education, skills, flexibility and location of Canada's unemployed workers are not well matched to the needs of industry.

Figure 1.4

UNEMPLOYMENT RATES BY COUNTRY



SOURCE: OECD LABOUR FORCE STATISTICS

iv) Investments in Upgrading Skills and Technology Have Lagged

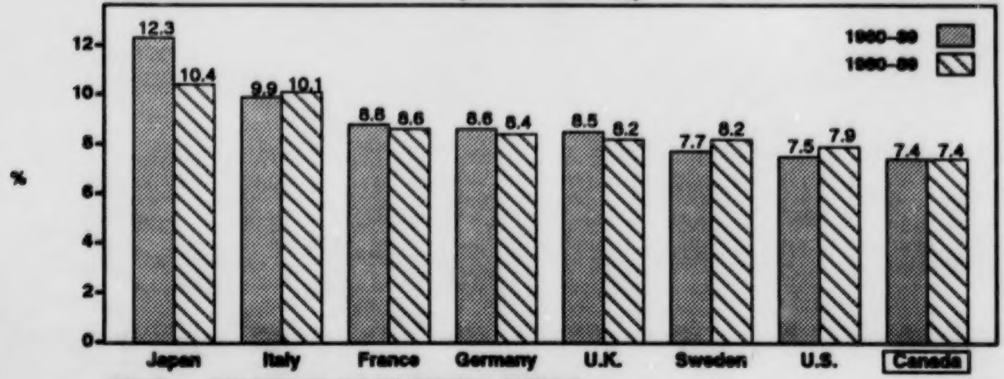
Canada's poor record in productivity and unemployment is in part an outcome of inadequate investment in upgrading skills and technology. More worrisome is that the investments that will drive productivity and employment in the future have been lagging.

At one level, Canada's overall investment performance has improved since the 1970s. Measured in inflation-adjusted terms (1981 dollars), the share of GDP devoted to aggregate investment rose from less than 20 percent in 1970 to about 25 percent by the late 1980s. Canadian investment in real terms grew at an average annual rate of 5.6 percent over the 1970–88 period, the best performance among the G7 nations.5

Despite this favourable overall picture, however, evidence is accumulating that those investments most linked to enhanced productivity have lagged, although there are exceptions in individual sectors. Although Canada's investment in machinery and equipment as a percentage of GDP rose in the 1980s, it continues to be lower than in other advanced nations (see Figure 1.5).

Figure 1.5

MACHINERY AND EQUIPMENT INVESTMENT AS A % OF GDP
(AVERAGE 1980–89)

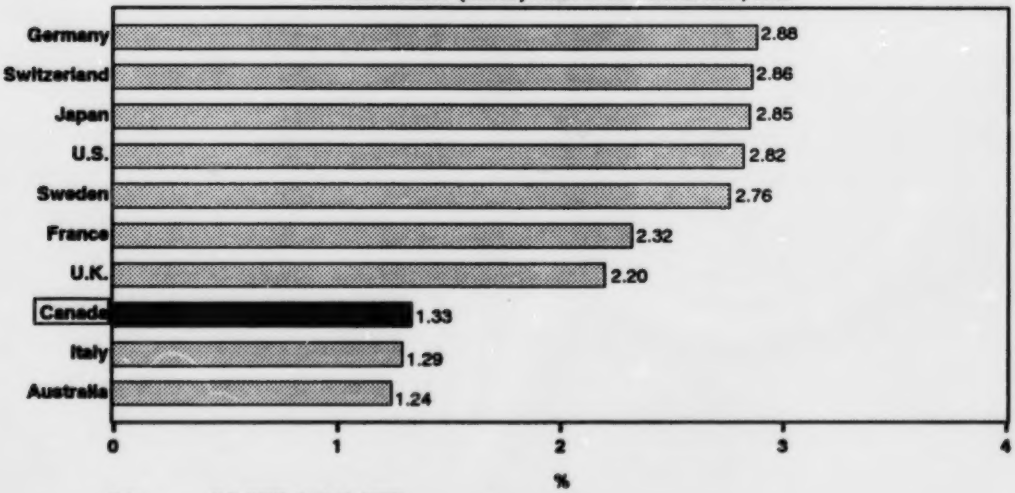


SOURCE: OECD ECONOMIC OUTLOOK HISTORICAL STATISTICS

Similarly, in R&D spending Canada trails most other G7 nations by a substantial margin (see Figure 1.6). Also relevant to the issue of investments in upgrading skills and technology is the fact that Canadian expenditures on worker training have been low by international standards, especially private sector expenditures. Investments in formal worker training by Canadian employers are well below levels attained by Japanese, German and American employers. While absolute levels of Canadian investment in education are among the highest in the world, it is far from clear that this massive national investment has been effective in improving Canadian productivity. Indeed, as we will discuss, there are significant weaknesses in Canada's human resource policies and position.

Figure 1.6

GROSS EXPENDITURE ON RESEARCH AND DEVELOPMENT (GERD) AS A % OF TOTAL GDP, 1989



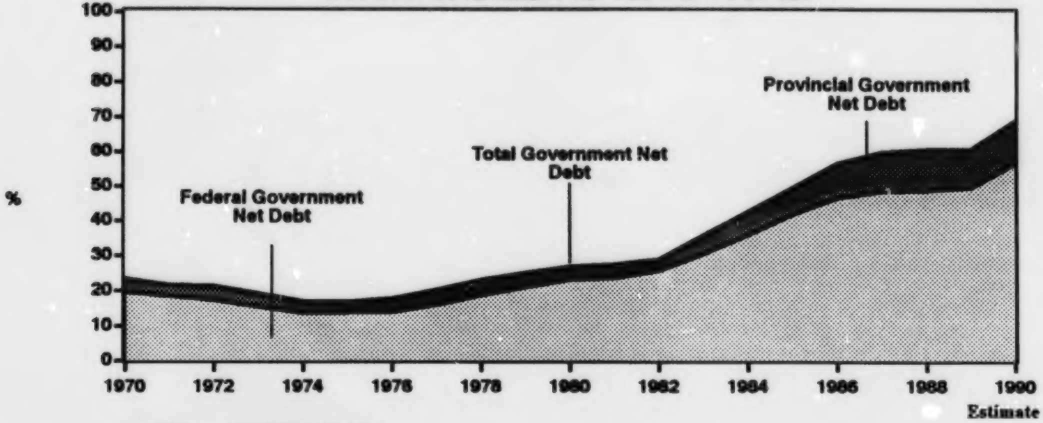
Note: U.K. ([illegible]), Australia ([illegible])
SOURCE: OECD MAIN SCIENCE AND TECHNOLOGY INDICATORS

v) The Current Macroeconomic Environment Is Not Supportive of Investment

The ability of the government to create a stable macroeconomic environment is a significant issue. The federal government's fiscal position has deteriorated dramatically since the early 1970s. In 1990, the federal public accounts deficit was $30.5 billion, or 4.5 percent of GDP. Federal deficits have exceeded $25 billion every year since 1981-82, with the accumulated federal debt more than doubling. Most of the provinces have also been running deficits over the past decade. Ontario, Canada's biggest province representing 38 percent of GDP, is forecasting a record $9.7 billion deficit for fiscal year 1991-92, followed by continuing large deficits through the mid-1990s.

Fueled largely by chronic federal government deficits, total government debt as a percentage of GDP in Canada has ballooned over the past decade and is now the second highest among OECD countries; only in Italy is the government sector more indebted. As of 1990, combined federal and provincial debt approached a striking 70 percent of GDP (see Figure 1.7). Ontario's debt is forecast to double from 1990 to 1995 to about $70 billion, or approximately 20 percent of its forecasted GDP. Interest on the federal debt alone is now equivalent to 4.2 percent of GDP.

Figure 1.7
CANADIAN GOVERNMENT NET DEBT AS A % OF GDP



SOURCE: STATISTICS CANADA

The size of government deficits, coupled with Canada's falling savings rates, has meant that an increasing proportion of government debt is now held by foreigners. Largely because of persistent public sector deficits, Canada's net foreign indebtedness has increased sharply. By year-end 1990, total Canadian foreign debt stood at $230 billion (35 percent of GDP), making Canada the second biggest debtor nation in the world, behind the United States. Not only does this mounting foreign debt burden necessitate an increasing flow of payments to foreigners to cover debt servicing obligations, thus reducing national income, it also risks hampering the ability of Canadian governments to invest in needed public infrastructure and to maintain a macroeconomic environment that supports the efforts of Canadian firms to upgrade.

2. THE STUDY

The new circumstances facing the Canadian economy call for a fresh and non-partisan look at all aspects of Canada's industrial environment. This study of Canada's competitiveness, supported by the Business Council on National Issues and the Government of Canada, attempts to make a contribution to this goal. It has grown out of, and become a distinctive part of, an international study of the sources of national economic success. The theoretical framework, and the findings from research in ten leading trading nations (accounting for more than 50 percent of world trade), are described in *The Competitive Advantage of Nations* (The Free Press, 1990).

This study aims to take an independent, objective look at the Canadian economy. Using the new framework, we sought to bring a fresh perspective to bear on questions that have in some cases been debated for decades. While applying a common methodology to allow comparisons with the original ten nations, we have endeavoured to be sensitive to that which is distinctly Canadian. Nations are unique, and Canada is certainly no exception. In particular, Canada's proximity to the U.S. and its reliance on foreign investment are distinctive features of the Canadian economy. We amplified and extended some parts of the theory and methodology to address these differences.

A principal finding of the ten-nation study is that competitiveness cannot be understood at the aggregate level. No nation competes successfully in everything. Rather, nations and firms succeed or fail in particular industries and often in particular segments of industries. It is at this level that the process of productivity growth in an economy is best understood. One important distinguishing feature of this study is its microeconomic orientation, which we hope will provide a complement to the more macroeconomic examinations of Canadian competitiveness that have preceded it.

The project team for this study was drawn from Monitor Company. Working under Professor Porter's overall direction, and supplemented by team members drawn from the original ten-nation study, the research took place throughout Canada and received valuable assistance and cooperation from countless Canadians. While the team benefited greatly from ongoing input from the study's Economic Advisory Board, many government officials and hundreds of representatives of the private sector, the conclusions are our own.

The study makes no pretense of being exhaustive. We have inevitably had to emphasize those areas we believe to be most salient. Nor can the study attempt to summarize or do full justice to the rich literature on the Canadian economy, upon which we drew heavily. Our principal aim has been to provide a holistic frame of reference with which to understand the many facets that influence Canadian competitiveness and to identify some of the areas in which the need for change is most pressing. We will both verify some findings that are well known to many Canadians, and highlight new areas that have received little attention. Above all, we offer a new way of thinking about competitiveness that must be internalized by business, labour, government and individual citizens.

A. Methodology

In the first phase of the study, a detailed analysis was undertaken of Canada's patterns of trade and the shifts in Canada's relative competitive position over time. We focused on the traded sector for a number of reasons. It is a large and increasingly important portion of the economies of all developed nations, and has particular leverage for national productivity growth. This is especially true in a mid-size nation such as Canada, where the ability to trade frees productive domestic industries from the constraints of the local market. Thus, productive industries can grow and absorb resources from less productive industries whose products can be imported.

In addition, the traded sector is where firms from many nations compete. It is the place where one can best examine the ways in which the economic context in different nations creates advantages or disadvantages for their firms. The traded sector represents a unique window into the sources of national economic prosperity.

Our analysis of Canada's exporting industries provided a key foundation for later phases of the study. What is important to an economy is not so much the industries in which success or failure occurs, but the process of adjustment and change that is revealed. We looked for indications of the health of the upgrading process, and the exposure of Canadian industries to competitive changes.

The second phase of the study consisted of a detailed historical and current analysis of 25 industries representing approximately 37 percent of total Canadian exports in 1989. Dozens of other industries were also examined in less detail during the course of the study.

The 25 industries were chosen to represent the important exporting sectors of the Canadian economy, such as materials and metals, transportation equipment, forest products, petroleum and chemicals, and food and beverages.[6] We sought to examine both processed and unprocessed natural resource industries, both manufacturing and service industries, both foreign- and domestically controlled industries, and to include some industries that have been conspicuously successful in exporting to markets other than the United States. We endeavoured to include industries that had been gaining position as well as some that were losing position in world trade. The original ten-nation study focused on successful industries for each nation because the large sample of industries studied globally also exposed many of each nation's failures. Here, we deliberately included some failures to allow comparisons between Canada's competitive and uncompetitive sectors.

The majority of industries met the criterion of having (or having once had) a high world export share. This was taken as a sign that Canada had a competitive international position. Some of Canada's internationally successful industries have made significant investments abroad, and we included several in our sample. At the same time, foreign investment into Canada is substantial. To develop an adequate understanding of competitiveness in the Canadian context, we felt it essential to include some industries in which foreign investment has been significant -- such as automotive assembly, styrene and industrial explosives -- in order to understand the types of activities performed in Canada versus abroad.

Other industries were chosen in the interest of achieving a representative balance of the whole economy. Thus, industries such as beef processing, manufactured (pre-fabricated) housing, human biological products and cobalt radiation therapy equipment were included to provide a window on important broad sectors. It was also deemed important to include the Canadian services sector, so industries such as life insurance, consulting engineering and waste management were studied. A few industries were included in part because of their significance to particular regions of Canada, such as fish processing to the Atlantic provinces, aluminum smelting to Quebec and automotive-related industries to Ontario. In certain sectors such as semiconductors/computers and textiles/apparel, no industry was selected for study. This reflects the fact that in the majority of cases, no such competitive industry (as defined by Canada's world export share) exists in Canada.

Figure 1.8
INDUSTRIES SELECTED AND RATIONALE FOR SELECTION

INDUSTRY	HIGH SHARE OF WORLD EXPORTS	HIGH LEVEL OF CANADIAN DIRECT INVESTMENT ABROAD	HIGH LEVEL OF FOREIGN CONTROL	REGIONAL SIGNIFICANCE	SERVICE INDUSTRY
Newsprint	✔				
Market Pulp	✔				
Nickel	✔				
Aluminum	✔	✓	✓	✓	
Atlantic Groundfish	✓			✔	
Styrene	✔		✓	✓	
Electricity	✔				
Beef Processing			✔	✓	
Manufactured Housing	✔				
Auto Parts	✔		✓	✓	
Auto Assembly	✓		✔	✓	
Pulp & Paper Equipment			✔		
Ice Skates	✔				
Urban Rail	✔	✓		✓	
Flight Simulators	✔	✓		✓	
Industrial Explosives			✔		
Commuter Aircraft	✔		✓	✓	
Central Office Switches		✔			
Geophysical Contracting	✓				✔
Consulting Engineering	✓				✔
Whisky	✔	✓	✓		
Life Insurance	✓	✓		✓	✔
Human Biologicals	✔				
Waste Management		✓			✔
Radiation Therapy Equipment	✔				

✔ – Primary Consideration
✓ – Secondary Consideration

Our industry research consisted of extensive interviews with industry participants, government officials and other experts, and a review of published and unpublished data. The aim was to diagnose the competitive position of each industry, understand the Canadian context in which it resides and expose the historical and present circumstances that have contributed to its success or failure. In addition to conditions inside Canada, we also sought to understand the industry's interconnectedness with the U.S. and other nations, both as markets for industry output and sources for critical inputs. Our findings were presented to industry participants and government officials for verification and comment. Several hundred senior industry executives participated in this process.

Of the 25 industries studied, detailed descriptions of four (newsprint, central office switches, whisky and geophysical contracting) are included in this volume. They are representative of important themes in the Canadian economy. Although descriptions of all the others cannot be included because of space limitations, numerous examples drawn from the remaining industries are referred to throughout the study and included as empirical support for our findings.

The third phase of the study entailed an audit of the institutional and public policy environment in Canada and its impact on the way Canadian firms compete. Government policies have a significant though often indirect influence on a nation's competitiveness, and government has been a particularly important influence in Canada. While our focus was predominantly on federal policies, selective provincial policies were also examined. Our top-down look at Canada's institutional and policy context was integrated with bottom-up findings gleaned from our industry studies to evaluate how individual government policies and Canadian institutions have either enhanced or impeded the competitive advantage of Canadian firms. Here in order to augment our own research we have drawn freely on many useful previously published reports in specific subject areas. In many cases our findings are strongly supportive of previous studies, and we offer our theoretical framework as a helpful way to understand the reasons for past findings as well as to see them in a broader context.

Taken together, these three phases provide the raw material to assess Canada's relative position in the world economy, the underlying sources of Canadian competitive advantage, and the health of the structural adjustments that are underway. Our aim was to identify the most significant constraints and challenges to upgrading the economy and to translate these into conclusions and implications.

Our mandate was to assess the state of competitiveness in Canadian industry, not to make detailed policy recommendations. That is the proper task of Canadians and their elected representatives, who are charged with the responsibility of fashioning specific policies to ensure enhanced international competitiveness. Instead, we have identified the most important impediments to future Canadian prosperity, the critical areas of future opportunity, and the implications these have for the policy-making process.

While a significant portion of this document is devoted to understanding the historical roots of Canada's current circumstances, our intention is not to affix blame or to dwell on the past. Past behaviour was the result of a set of circumstances that have changed forever, and all constituencies in the economy must share in overcoming today's challenges. There is no going back to recapture the Canadian economy of the past. Rather, the emphasis must be on the future. Our hope is that this study will stimulate discussion and debate about how to move forward and will serve as a catalyst for making the considerable changes in company strategy, labour-management relationships and government policy that we feel are necessary. The extent of needed changes will make all Canadians uncomfortable. With a clearer frame of reference for why changes are necessary, we hope that Canadians can get on with them, rather than let unproductive criticism of past behaviour sap energy and impede action.

B. Preview of the Study

The volume is organized into eleven chapters. Chapter 2 analyzes Canada's export performance and trade patterns over time. Chapter 3 outlines the theory first presented in *The Competitive Advantage of Nations* and extends the theory to consider a number of issues particularly significant to Canada. Chapter 4 describes four Canadian industries that, in many ways, can be seen as metaphors for the economy generally. These industry studies provide a fitting backdrop for our assessment of the state of competitiveness in Canada's economy. Chapter 5 provides a brief overview of findings from the 25 industry studies and presents an overall framework for Chapters 6 through 9, which provide an analysis of the determinants of Canada's competitive advantage. Chapter 10 provides a synthesis of our findings on Canadian determinants, the role of government and the challenges to Canadian prosperity. Finally, Chapter 11 highlights the implications of our findings for Canadian firms, labour, governments and individual citizens.

CHAPTER 2

CANADA'S POSITION IN INTERNATIONAL COMPETITION

A country's performance in the traded sector provides a unique window on its overall competitiveness. One important indication of the health of upgrading in an economy is the pattern of competitive success and failure in its exporting industries and, most importantly, how that pattern has evolved. No industry is inherently desirable or undesirable for an economy. What matters is the productivity of a nation's industries and the economy's capacity for productivity growth over time. A healthy process of national economic upgrading involves a shift toward more sophisticated methods in more productive industry segments. The evolving pattern of success and failure at the industry level sheds light on the underpinnings of national competitiveness.

In this chapter, we examine Canada's export sector as well as changes in the pattern of exports and imports since 1978. We first examine the overall pattern of Canadian exports using statistical methods. We then identify those industries and clusters of related industries in which Canada has a competitive advantage, compare Canada's pattern of competitive industries to those in other countries, and seek insights into the nature and process of competitive upgrading that is underway. Canada's trade balances by cluster, and their changes over time, are examined, as is the role of foreign-owned companies in Canada's trade. Finally, we draw on this analysis to develop a broad method to categorize Canada's exports.

The purpose of this analysis is twofold. The first is to present the facts, at the level of the most narrowly defined industries possible, about the changing patterns of Canada's trade. The second is to seek preliminary insights into the nature of the competitive adjustment process that is underway. Does Canada's evolving pattern of trade suggest an economy upgrading to higher levels of productivity? What signs are there of the capacity for future productivity growth? What does the pattern of trade reveal about likely tendencies for structural adjustment? The short period since the Free Trade Agreement, together with other recent discontinuities, suggest that even 1989 data may fail to do justice to important recent changes. Nevertheless, we present the best systematic evidence now available in the hope that it will at least signal current developments.

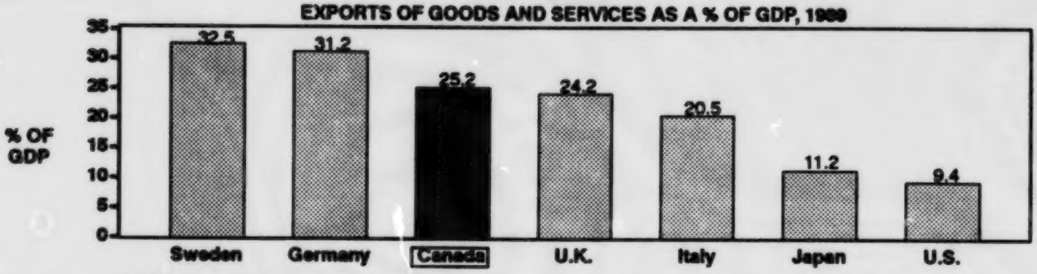
Insights into the process of adjustments drawn from this chapter represent hypotheses to be verified in our detailed studies of individual industries. Indeed, it is critical to understand the microeconomic processes that underlie the overall patterns of trade.

1. PROFILING CANADA'S COMPETITIVENESS

Canada's traded sector is a significant component of the economy, more so than in many OECD countries (see Figure 2.1).

Figure 2.1

EXPORTS OF GOODS AND SERVICES AS A % OF GDP, 1989

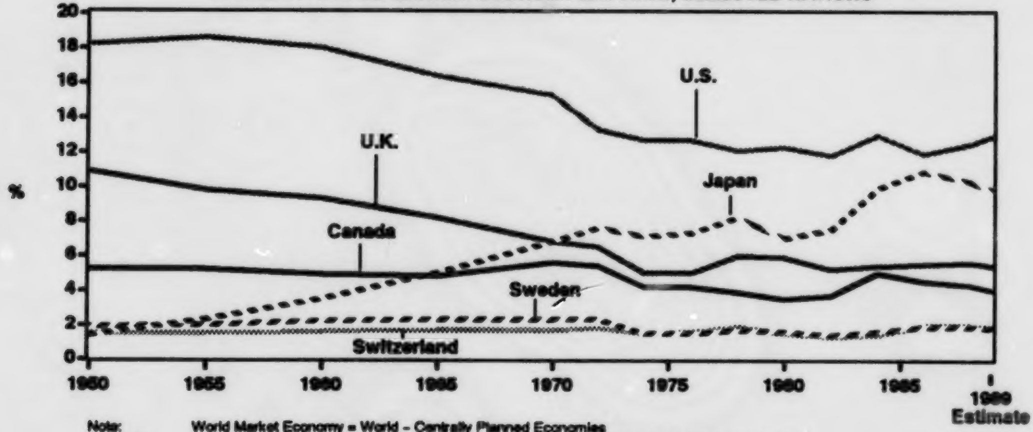


SOURCE: OECD NATIONAL ACCOUNTS

Canada's overall share of world market economy exports has varied between four and five percent over the past 30 years, as shown in Figure 2.2.[1] The trend for the period as a whole has been one of slow decline. More important than the trend in overall share, however, is how the composition of Canadian exports has evolved. This provides insights into the nature of adjustments that have been underway.

Figure 2.2

SHARE OF WORLD MARKET ECONOMY EXPORTS, SELECTED NATIONS



Note: World Market Economy = World - Centrally Planned Economies
SOURCE: UN INTERNATIONAL TRADE STATISTICS YEARBOOKS, MONTHLY BULLETINS OF TRADE STATISTICS

A. Patterns of Canadian Competitive Advantage

National advantage resides in particular industries and industry segments. To understand Canada's position in international competition, we must disaggregate the economy to the level of strategically distinct businesses. Analysis by broad aggregates such as the two-digit Standard Industry Classification (SIC) level obscures the underlying patterns of competitiveness by mixing together very different industries that vary greatly in their labour skills or technology requirements and in their overall competitive dynamics. The basis for our analysis is the United Nations Standard International Trade Classification (SITC) trade statistics, which measure exports and imports in approximately 4,000 narrowly defined industries at the three-, four- and five-digit levels.[2] SITC statistics are used because they allow us to compare the trade performance of a large number of countries over time.

Drawing on the SITC statistics, a number of measures were used to analyze Canada's trade patterns and to discern Canada's relative position in a given industry or industry cluster. The first was *export share*, or the nation's share of total world market economy exports in the industry. Share of world exports was used as a proxy for the presence of competitive advantage in an industry. If a nation's industry held a share of total world exports greater than the nation's average share, and if this share was stable or increasing, then this was taken as a sign that the nation's industry had a clear and sustainable advantage in that particular business. Other measures, such as domestic profitability, are less reliable because of the existence of protection, differences in reporting requirements, accounting conventions and the lack of conformable data. Finally, firm diversification makes it very difficult to compile profitability data by industry.[3]

The second and related measure was *share of world cluster exports*. This measure compares a nation's exports in a cluster of interconnected industries to total world exports of industries in that cluster. A nation's competitive industries tend to be linked together into clusters of related industries that are self-reinforcing. As we will explore more fully later, the nature and evolution of clusters represents a seminal feature of an advanced economy. The share of world cluster exports is determined by assigning all SITC industries to broad clusters of interconnected industries and then comparing each nation's exports to total cluster exports.[4]

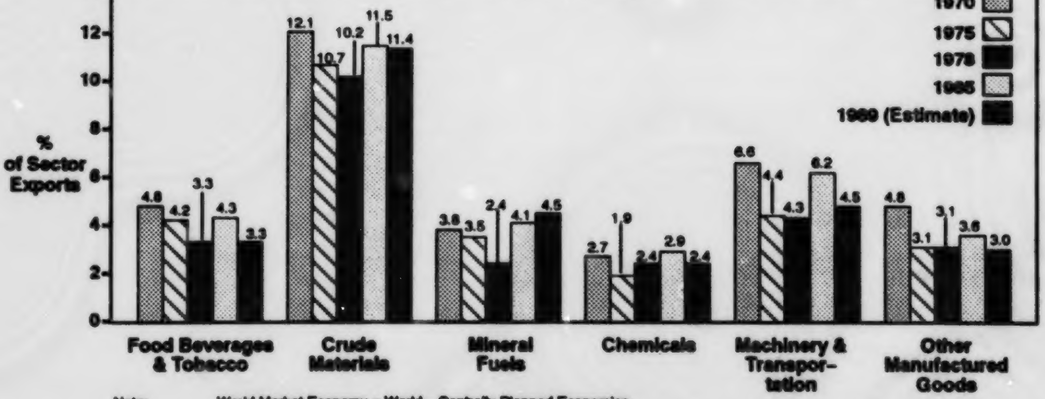
The third measure employed was *share of total country exports*, which is the absolute share of a nation's total exports represented by a particular industry or industry cluster. This is a measure of the contribution of an industry or cluster to a nation's export base.

B. Overall Composition of Canadian Exports

Figure 2.3 shows Canada's share of world exports by broad sector of the economy from 1970 to 1989, a common way of displaying the composition of a country's exports. Canada has its largest world export shares in the crude materials sector, a rather unusual pattern for a wealthy, industrialized nation. A larger proportion of exports of most advanced nations is in manufactured goods.

Figure 2.3

CANADIAN SHARE OF WORLD MARKET ECONOMY EXPORTS BY SECTOR



Note: World Market Economy = World – Centrally Planned Economies

SOURCE: UN INTERNATIONAL TRADE STATISTICS YEARBOOKS, MONTHLY BULLETINS OF TRADE STATISTICS

In terms of overall patterns of world trade, exports of chemicals, machinery and transportation, and other manufactured goods, have increased as a share of total world market economy exports. Their combined share of world exports rose from 66.1 percent in 1970 to 73.9 percent in 1989. Exports of natural resource dependent sectors showed a corresponding decline.

As world trade in manufactured goods has increased, Canada has not maintained its share of manufacturing exports. In more recent years, Canada's world export share in resource sectors such as crude materials and mineral fuels has increased, while its share in other sectors has declined. To gauge Canada's true position in international competition, however, we must go beyond aggregated sectors and examine the mix of narrowly defined exporting industries.

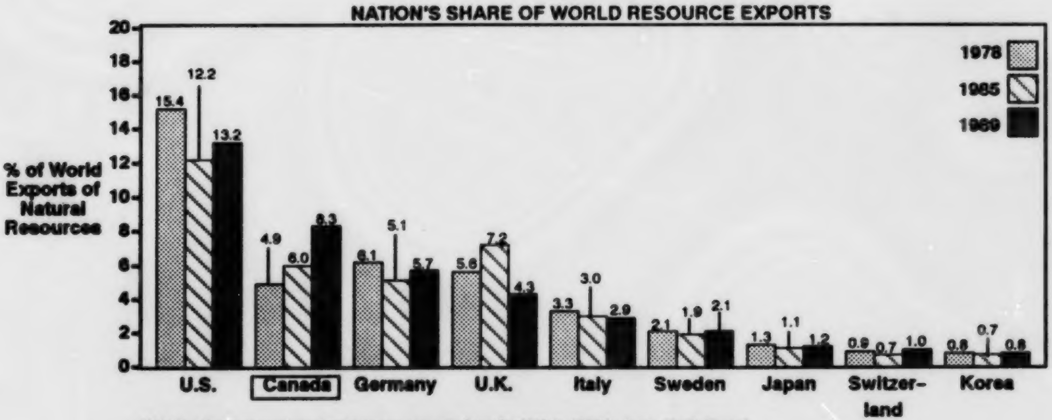
i) Significant Natural Resource Exports

Most of Canada's leading export industries are dependent on natural resources. To measure the extent of this, all SITC industries were classified based on their reliance on natural resources. Industries were designated natural resource-dependent when they involved agricultural, fish, or forest products, minerals, fuels, or other natural or cultivated commodities that are not extensively processed. We then assessed the level of processing (unprocessed, semi-processed or processed) for each industry, taking into account the degree of technology used and whether consumer goods were packaged or branded. Highly processed goods marketed as branded products were considered non-resource-dependent (for example, branded prepared breakfast cereals, though agriculturally-based, were not classified as resource-based).

Canada's 1989 share of world resource-based exports was 8.3 percent. More significant is the striking increase in Canada's resource-based export share, up from 4.9 percent share in 1978 (see Figure 2.4). By contrast, Canada's share of world exports in non-resource-based exports was 2.4 percent in 1978, rose to 3.8 percent in 1985 and has since declined to 2.8 percent in 1989.

Figure 2.4

NATION'S SHARE OF WORLD RESOURCE EXPORTS

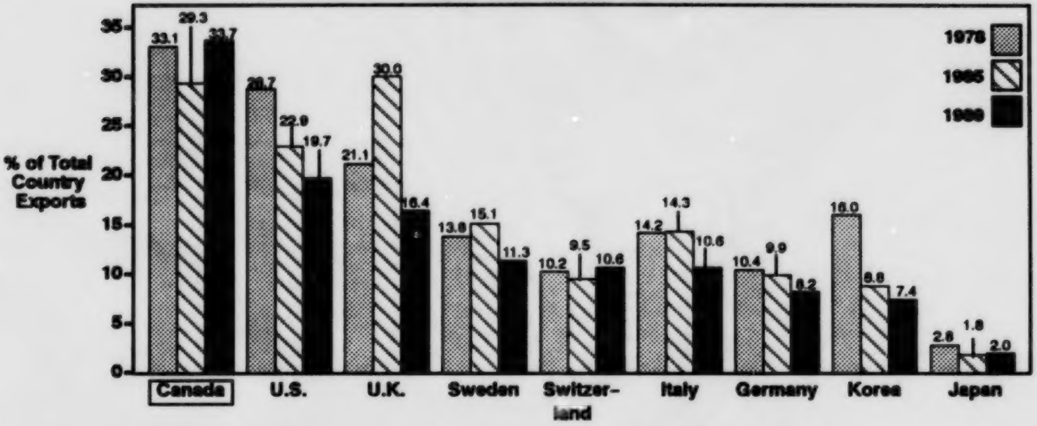


Note that the increase in natural resource exports from the U.K. in 1985 is due to North Sea oil.
SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

Resource-based exports account for 45.8 percent of Canada's total exports. Figures 2.5 and 2.6 compare the resource dependence of the exports of nine prominent trading nations. Canada has by far the highest share of country exports in unprocessed and semi-processed natural resources of any of the nations we studied. By contrast, Sweden, another nation with substantial natural resources, exports resource-based products largely in the form of processed goods.

Figure 2.5

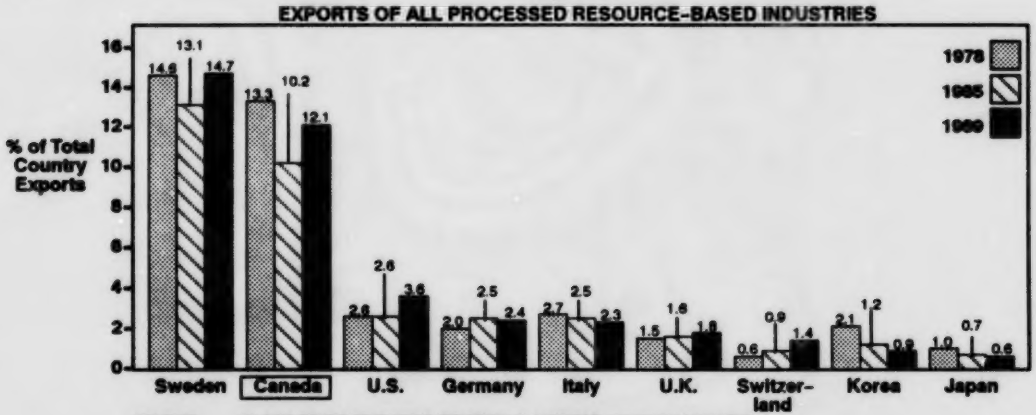
EXPORTS OF ALL UNPROCESSED AND SEMI-PROCESSED RESOURCE-BASED INDUSTRIES



Note that the increase in unprocessed natural resource exports from the U.K. in 1985 is due to North Sea oil.
SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

Figure 2.6

EXPORTS OF ALL PROCESSED RESOURCE-BASED INDUSTRIES



SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

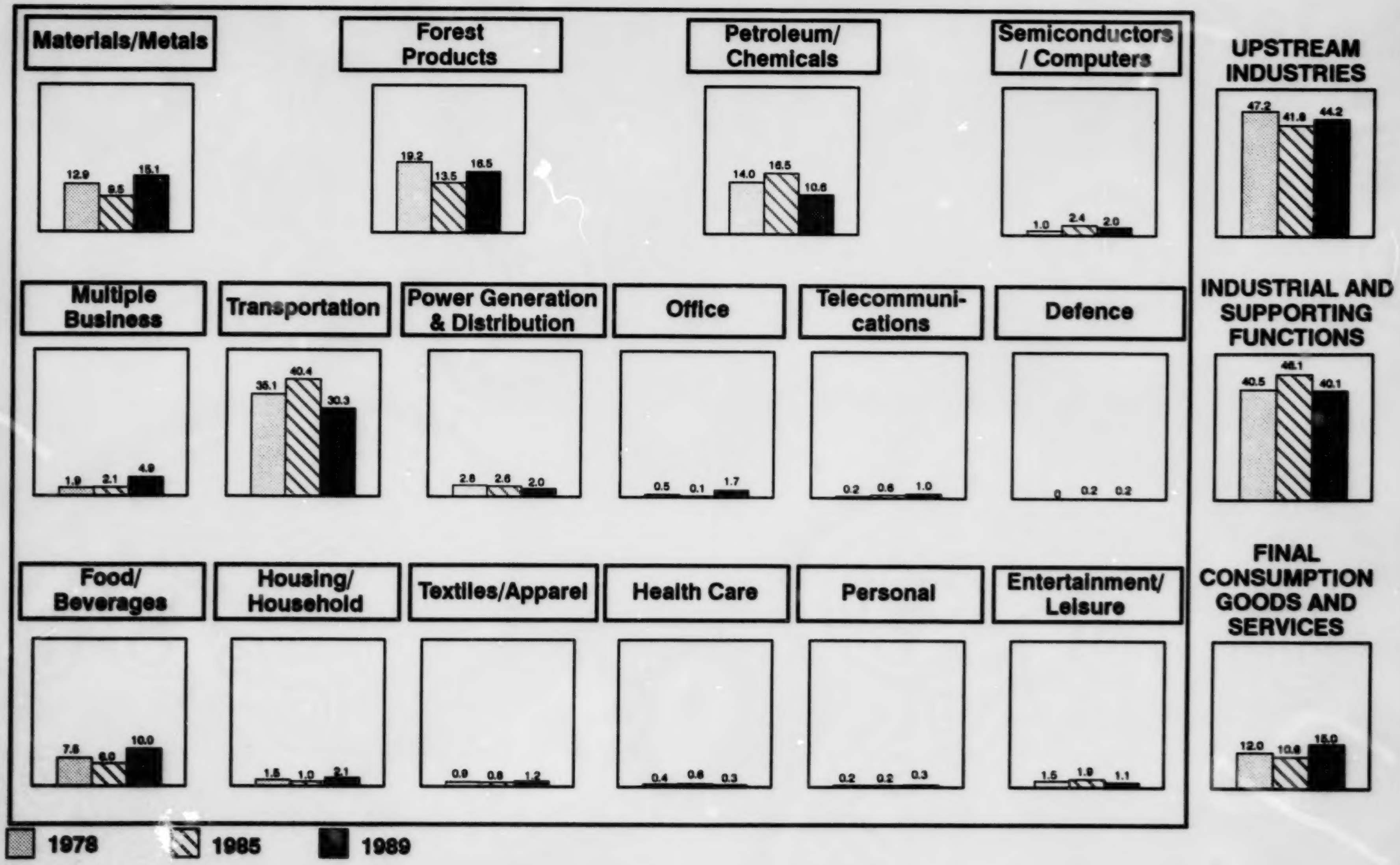
Canada's tendency to export unprocessed and semi-processed natural resources has persisted, in contrast with other advanced nations. Korea, for example, illustrates the more typical evolution, where the share of resource-dependent industries declines as the economy moves toward advanced status. Sweden's share of unprocessed natural resource exports has also decreased, although it has maintained its share of exports in processed resource-based industries. Sweden has capitalized on competitive advantages in process technology and sustained its competitiveness in resource-based industries, even though its natural resource positions themselves no longer represent an advantage.

Exports of natural resource-intensive goods are by no means undesirable. However, a high proportion of exports of unprocessed resources makes Canada sensitive to commodity price shifts, technological substitution, and the emergence of lower cost competitors. The problem is made more acute by the fact that technological change is reducing resource intensity in advanced economies, and that unprocessed resource industries are especially accessible by developing countries. These concerns make it important that Canada exploits its resources as productively as possible, as we will discuss in more detail in later chapters. They also suggest that Canadian industry has failed to upgrade or extend its competitive advantages into processing technology and the marketing and support of more processed goods. Canada's relative weakness in process technology -- even in natural resource industries -- is evident in these data and has been confirmed in our industry studies.

II) Canadian Exports Are Concentrated in Five Broad Clusters

Another illuminating way of examining the underpinnings of Canada's competitive advantage is to examine how its export industries are interconnected. To do this, we categorized all of Canada's export industries by broad clusters, as displayed in Figure 2.7. Clusters are groups of industries connected by buyer-supplier relationships or strong interrelationships in terms of products and technology. They involve end products, specialized inputs used in these products, specialized machinery employed in making them and associated services. Chapter 3 discusses clusters and their significance further.

FIGURE 2.7
PERCENTAGE OF ALL CANADIAN EXPORTS BY BROAD CLUSTER



Note: Totals may not add due to rounding
SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

To display the patterns of national advantage in Canada and the ways in which they have been changing, we employ the *cluster chart* introduced in *The Competitive Advantage of Nations*. This divides all industries in an economy into 16 broad clusters by end-use application.[5] Each cluster includes end products, specialized inputs, specialized production machinery and associated services. This division reflects the fact that demand conditions combined with close vertical and horizontal relationships among industries play important roles in stimulating competitive advantage. Within these broad clusters there may be a few or even many narrow clusters of tightly interlinked industries.

Across the top row of this chart are four broad clusters containing industries whose primary products are inputs to products used in many other industries. These are termed *upstream industries*. Most of these industries are resource-based, with the exception of semiconductors/computers. This comparatively new upstream cluster encompasses the most modern range of products that are basic inputs to virtually every other industry. Across the middle of the chart are six broad clusters connected to *industrial and supporting functions*. Industries at this level typically compete on technology and often provide the industrial core of an economy. Most are related to specific end-uses such as transportation or telecommunications. The multiple business category comprises such products as scientific instruments, pumps, general purpose machinery and other industrial goods and services (for example, accounting, building, and maintenance services) sold to a wide range of industries. In most advanced economies, the multiple business cluster comprises a substantial and often growing group of industries. This is because an advanced economy enjoys a range of competitive industries that serve as sophisticated buyers to multiple business inputs. Along the bottom row are another six broad clusters associated with *final consumption goods and services*. Industries at this level are connected to end consumer needs.

Economies generally begin the upgrading process from initial positions at the top (upstream industries) or the bottom (final consumption goods and services) level of the cluster chart. Resource-rich countries typically begin at the level of upstream industries, while resource-poor nations start from labour-intensive final consumption goods. Most successful advanced economies gradually develop competitive industries in the middle (industrial and supporting) level of the chart as they upgrade and lay the foundations of an industrial core.

Canadian exports are highly concentrated, much more so than the other nations we studied. Three of the 16 broad clusters -- materials/metals, forest products, and transportation equipment -- account for nearly two-thirds of all Canadian exports. Five clusters (adding petroleum/chemicals and food/beverages) account for more than 82 percent of total Canadian exports. Canadian exports are concentrated in upstream industries, where three out of the five major sectors are located, representing over 44 percent of all exports. Canadian exports in industrial and supporting industries are dominated by transportation equipment. Aside from the Auto Pact industries, Canada's pattern reveals a mix that is particularly skewed toward upstream industries. Final consumption goods represent a very small portion of Canadian exports.

Food/beverages is the one significant broad sector at this level, with exports composed predominantly of fish and grain. There are few significant exporting industries outside of these areas.

Canada's exports from upstream industries remains substantial, though they have decreased slightly since 1978 due to reductions in forest products, petroleum/chemicals, and semiconductors/computers. However, there was a substantial rise in materials/metals exports due to increased exports of ores.

In industrial and supporting functions, which account for 40 percent of all exports, there were slight shifts in Canada's exports away from transportation equipment and into multiple business inputs, which grew from 1.9 percent to 4.9 percent of total Canadian exports. However, the gains were predominantly otherwise unclassified special transactions in areas such as grain, soya bean, fish and other resource-based products. In contrast, other advanced nations such as Switzerland and Sweden increased shares in their multiple business clusters, with Switzerland's share growing from 24.8 percent to 28.3 percent and Sweden's from 5.3 percent to 6.9 percent of total country exports between 1978 and 1989. Canadian office and telecommunications-related industries showed slight increases. There were few signs, however, of development in most sectors at the industrial and supporting level.

The transportation equipment cluster dominates the industrial and supporting level, representing 30 percent of total country exports in 1989. Auto Pact industries represent approximately 79 percent of transportation equipment cluster exports.

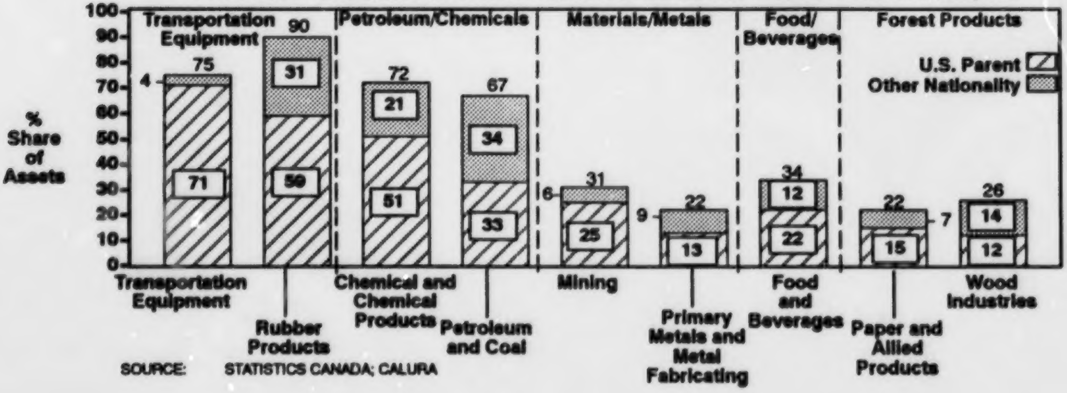
Although the mix of Canadian exports has shifted toward more final consumption goods, this increase was largely due to gains in food/beverages. These, in turn, came largely from unprocessed grain.

iii) Foreign-Controlled Companies Dominate Many Leading Export Clusters

Foreign ownership is high in Canada's five leading export clusters. Figure 2.8 displays the foreign-controlled share of assets in these clusters. Transportation equipment, Canada's leading export cluster, has the highest level of foreign-controlled industries.

Figure 2.8

FOREIGN-CONTROLLED SHARE OF ASSETS OF SELECTED CANADIAN INDUSTRIES, 1987



SOURCE: STATISTICS CANADA; CALURA

Foreign companies also dominate the petroleum/chemicals sector and are significant in food/ beverages, materials/metals and forest products. Of the other broad clusters, the computer sector is also notable for having a high degree of foreign control.

Many of the strategic decisions in important Canadian sectors are made in the context of the overall global strategies of the parent companies. While this is not necessarily a problem, foreign multinationals arguably enjoy greater latitude and flexibility in locational choices than Canadian-owned firms. How foreign multinationals' locational choices for sophisticated home base activities will shift in response to changes in international competition represents a crucial issue for the Canadian economy.

C. Exports of Competitive Industries

So far we have briefly considered all of Canada's export industries. To investigate the patterns of success and failure more deeply, we focused on those industries in which Canada was internationally successful. An industry is considered internationally successful if it possesses competitive advantage relative to its significant worldwide competitors. We use the principle of revealed comparative advantage as an indicator of competitive advantage. Industries were considered "competitive" when Canada's share of world market economy exports in the industry equalled or exceeded its overall average export share of 5.1 percent in 1989 (referred to as the cutoff).[6]

The use of revealed comparative advantage might appear to designate roughly half of Canada's industries as competitive and the other half as uncompetitive. In practice, this is not the case in Canada or other economies. Of the approximately 2,600 industries in Canada, only 246 Canadian industries exceeded the cutoff. These industries accounted for a remarkable 75.8 percent of total Canadian exports. A similar pattern occurs in other economies.[7] In practice, nations seem to be competitive in a relatively small number of industries that dominate exports.

Industries with export share below the cutoff may be competitive in niches. In practice, however, our use of highly disaggregated industries reduces this possibility. More typically, such industries seem to be those involved in border trade or those where there is trade between affiliates.

The UN trade data was supplemented with additional data on foreign direct investment, because industries may have extensive foreign investment that makes an exclusive focus on exports misleading. In addition, we used data on trade in services to more completely incorporate service industries. Field interviews were also used to expose other competitive industries not classified separately in the SITC system. Canadian industries therefore judged to be competitive were those that have a world export share above Canada's average of 5.1 percent, or an international position based on a combination of exports and Canadian investment abroad that is estimated to be as significant. The complete list of competitive Canadian industries displayed in the cluster charts is presented in Figure A in the Appendix.[8] The statistics in the remainder of this section refer to exports in Canada's competitive industries as opposed to its exports in all industries. The intent is to describe the position of the industries in which Canada does relatively well and compare this position with that of other nations.

I) Canada's Most Competitive Industries Are Narrowly Focused

Canada's 50 leading industries in terms of their share of world exports are shown in Figure 2.9. The top 50 such industries serve as an illustrative metaphor for the competitive performance of a national economy. These industries, Canada's most competitive, are heavily based on natural resources. Of the top 50 industries, 35 are unprocessed or modestly processed forest products, ores, cereals and seeds, fish, pulp, and skins. Other industries include chemicals, transportation equipment, and auto parts. Industries producing machinery and other manufactured goods are virtually absent.

Figure 2.9

TOP 50 CANADIAN INDUSTRIES IN TERMS OF WORLD EXPORT SHARE, 1989

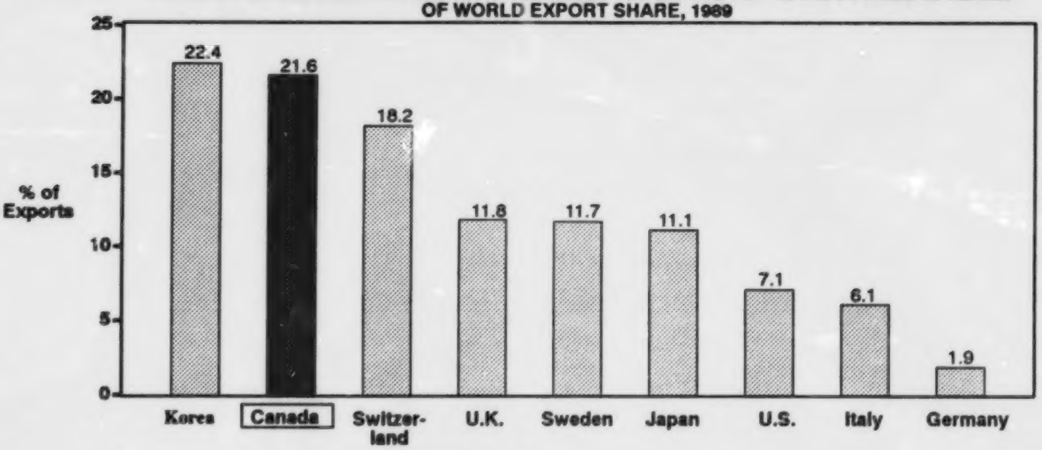
INDUSTRY	Share of Total World Exports	Export Value (US$000)
Shingles and Shakes	96.0	181,532
Alloy Pig Iron, etc.	92.9	92,805
Asbestos	92.0	375,570
Granulated Slag	86.8	214,727
Maple Sugar, Maple Syrup	85.2	31,389
Linseed	84.0	170,550
Chlorates of Sodium	83.5	67,572
Silver Ores, Concentrates	83.1	4,121
Other Precious Metal Ores, Concentrates	81.7	120,003
Mustard Seeds	81.1	34,796
Diesel–Electric Locomotives	76.7	317,312
Unmilled Canary Seed	76.4	30,247
Potassium Chloride	76.2	1,005,257
Semi–Chemical Wood Pulp	70.1	268,261
Crude, Unrefined Sulphur	70.1	503,903
Other Fructose	69.1	53,221
Copper Mattes	68.6	40,358
Methanol (Methyl Alcohol)	65.1	192,931
Nickel Mattes	63.4	547,029
Iron Ore Agglomerates	61.6	591,001
Fish Meat, excluding Frozen Fillets	61.1	161,345
Newsprint, Rolls, Sheets	60.4	4,793,762
Fish Liver, Roe, Dried, Smoked	60.0	140,266
Beaver Skins	58.2	5,540
Accounting Machines	55.6	27,944
Niobium, Tantalum, Vanadium	55.1	27,960
Chemical Wood Pulp, Coniferous Bleached	54.4	4,375,518
Isobutene–Isoprene Rubber	53.4	153,249
Gypsum and Anhydrite	53.0	44,886
Salmon, Whole Pieces, Prepared, Preserved	51.9	129,339
Lentils, Dried, Shelled	50.2	37,883
Turbo–Propeller Engines	49.4	507,315
Bran, etc., Other Cereals	48.3	21,834
Unmilled Buckwheat	48.0	6,845
Natural Uranium, etc.	45.4	384,872
Sawn Conifer Wood	45.2	4,547,271
Sulphur Dioxide	41.4	7,661
Unmilled Oats	40.6	134,983
Rape or Colza Seeds	40.1	527,207
Copper Ores, Concentrates	39.7	888,999
Other Skins	38.7	28,646
Motor Vehicle Seats	37.8	185,448
Lucerne (Alfalfa)	37.0	62,554
Other Public Transport Vehicles	36.2	168,754
Natural Gas, Gaseous	36.1	2,493,736
Chlorine	35.9	38,831
Selenium, Phosphorus, etc.	35.1	48,342
Ice and Roller Skates	35.1	25,025
Worked, Shaped Conifer Wood	35.0	156,185
Nickel Powders, Flakes	34.8	77,189
TOTAL		$25,051,994
SHARE OF TOTAL CANADIAN EXPORTS		21.6%

SOURCE: UN SITC TRADE STATISTICS (REVISION 3 PRELIMINARY)

Canada's top 50 industries accounted for 21.6 percent of total Canadian exports in 1989. As Figure 2.10 illustrates, this figure is higher than for the great majority of other nations studied, including small nations such as Switzerland and Sweden. This is the first sign that Canada's exports are more heavily concentrated in relatively few industries and sectors than elsewhere. This concentration is not necessarily a cause for concern, but makes an assessment of Canada's competitiveness in these industries all the more pressing. One weakness of an economy centered on a relatively few industries is the more limited possibilities for beneficial spillovers across industries and clusters. Such spillovers (or "externalities") are desirable, as we will discuss in the next chapter, because they speed upgrading and spawn new industries through shared technologies, similar distribution channels and other linkages.

Figure 2.10

SHARE OF TOTAL COUNTRY EXPORTS REPRESENTED BY THE TOP 50 INDUSTRIES IN TERMS OF WORLD EXPORT SHARE, 1989



Note: Top 50 out of approximately 4,000 SITC industries

SOURCE: UN SITC TRADE STATISTICS (REVISION 3 PRELIMINARY); MONITOR COMPANY ANALYSIS

The diversity and breadth of the German economy is an interesting contrast to Canada. Such diversity is reflected in the fact that its top 50 industries in terms of world export share account for a very low 1.9 percent of total German exports. Canadian exports are also much less diversified than those of Switzerland, with only 6.5 million people versus Canada's 27 million, although Switzerland also has a relatively high share of its total exports accounted for by its 50 leading industries. The top 50 Swiss industries, shown in Figure 2.11, cover a wide range, including watches, state-of-the-art precision machine tools and several machinery industries related to textiles, food processing, paper products and printing. The Swiss are also leaders in pharmaceuticals, specialty chemicals and instruments. The Swiss position in each industry is typically focused on the most sophisticated segments, which are often highly specialized and very profitable. Switzerland has been able to sustain these competitive positions over years.

Figure 2.11

TOP 50 SWISS INDUSTRIES IN TERMS OF WORLD EXPORT SHARE, 1989

INDUSTRY	Share of Total World Exports	Export Value (US$000)
Alkaloids, rye ergot etc.	91.7	196,612
Other watches, precious metal case	87.5	653,614
Watch movements, non-battery	81.8	33,724
Other wrist watches	77.6	596,113
Mixture provitamins, vitamins	73.1	353,731
Copper washers	62.3	37,011
Watches, battery, precious metal	60.7	585,613
Other lactones	59.6	199,714
Locomotive, external electric powered	50.6	9,246
Paper carton, box, etc. making machinery	50.3	208,422
Wrist watches, battery	47.9	1,238,333
Knee-type milling machines	46.2	28,704
Other carboxylic acid, phenol	45.2	94,714
Machine tool using electro-discharge	42.7	283,074
Chainsaw blades	42.1	42,836
Reactive dyes, etc.	42.1	320,581
Machines ancillary to printing	40.6	244,912
Acid dyes, mordant dyes	40.0	227,560
Hydraulic turbine water wheel	39.1	50,794
Drills of all kinds	37.5	276,016
Clock, watch parts, nes	36.9	186,420
Weaving machines parts	36.3	268,573
Direct dyes, etc.	35.0	80,186
Other microscope, photo. etc.	34.2	14,481
Weaving machines (looms)	34.1	495,519
Precious stones, etc. worked	33.8	342,564
Artificial teeth etc.	31.6	62,439
Stamps for philately	30.4	52,267
Grain milling etc. machinery	29.1	57,545
Medicaments containing other hormones	28.7	299,633
Bookbinding machine parts	28.4	31,919
Boring-milling machine nes	28.1	22,526
Gold, silversmith wares	28.0	72,523
Machine for filtering etc. beverage	28.0	23,815
Other grinder numerically controlled	27.5	170,364
Medicaments containing alkaloid	27.3	122,276
Disperse dyes, etc.	27.1	135,913
Amino-acids nes etc.	26.9	221,714
Glycosides, etc.	26.8	54,420
Hydrometers, barometers etc.	26.6	112,970
Other boring-milling machines	26.3	63,283
Synthetic organic brighteners	26.1	133,706
Punching, notching, machines	26.0	50,705
Platinum, alloys, unwrought	24.8	272,815
Domestic sewing machines	24.6	65,360
Other pocket-watches	24.5	15,446
Gear-cutting, etc. machines	24.1	92,817
Heterocyclic compounds phenothiazine	23.9	14,607
Other embroidery	23.7	114,660
Synthetic or reconstituted precious stones nes	23.6	25,287
TOTAL		$9,357,729
SHARE OF TOTAL SWISS EXPORTS		18.2%

Note: nes = Not elsewhere specified

SOURCE: UN SITC TRADE STATISTICS (REVISION 3 PRELIMINARY)

The comparison with Sweden is also telling. Like Canada, Sweden has a large share of exports in natural resource-based industries. For example, Sweden has significant world export shares in paper and other forest products. Its top 50 export industries, however, contrast sharply with Canada's narrow range. Sweden commands significant shares in transportation equipment and a range of machinery and mechanical products related to such sectors as forestry, health care, mining, and telecommunications. Swedish firms also have significant shares in industries such as ball bearings and specialty steel. Sweden, with 8.4 million people, exhibits much greater diversity in exports than Canada (see Table B in the Appendix).

Canada's economy has some parallels to that of New Zealand. New Zealand's top 50 industries are dominated by fruit, meat and animal products, wool, dairy products, fish and forest products. As that country continues to compete largely in these more structurally unattractive industries, it has experienced a steady erosion in its relative standard of living.

ii) Competitive Exports Are More Concentrated than Overall Exports

Internationally competitive Canadian industries account for nearly 76 percent of total Canadian exports. Eighty-four percent of Canada's exports in upstream industries are in industries designated "competitive." The figure for industrial and supporting industries is 71.8 percent and for final consumption industries, 65.3 percent. Most of Canada's resource-based industries are internationally competitive, whereas in manufactured goods the proportion is significantly less.

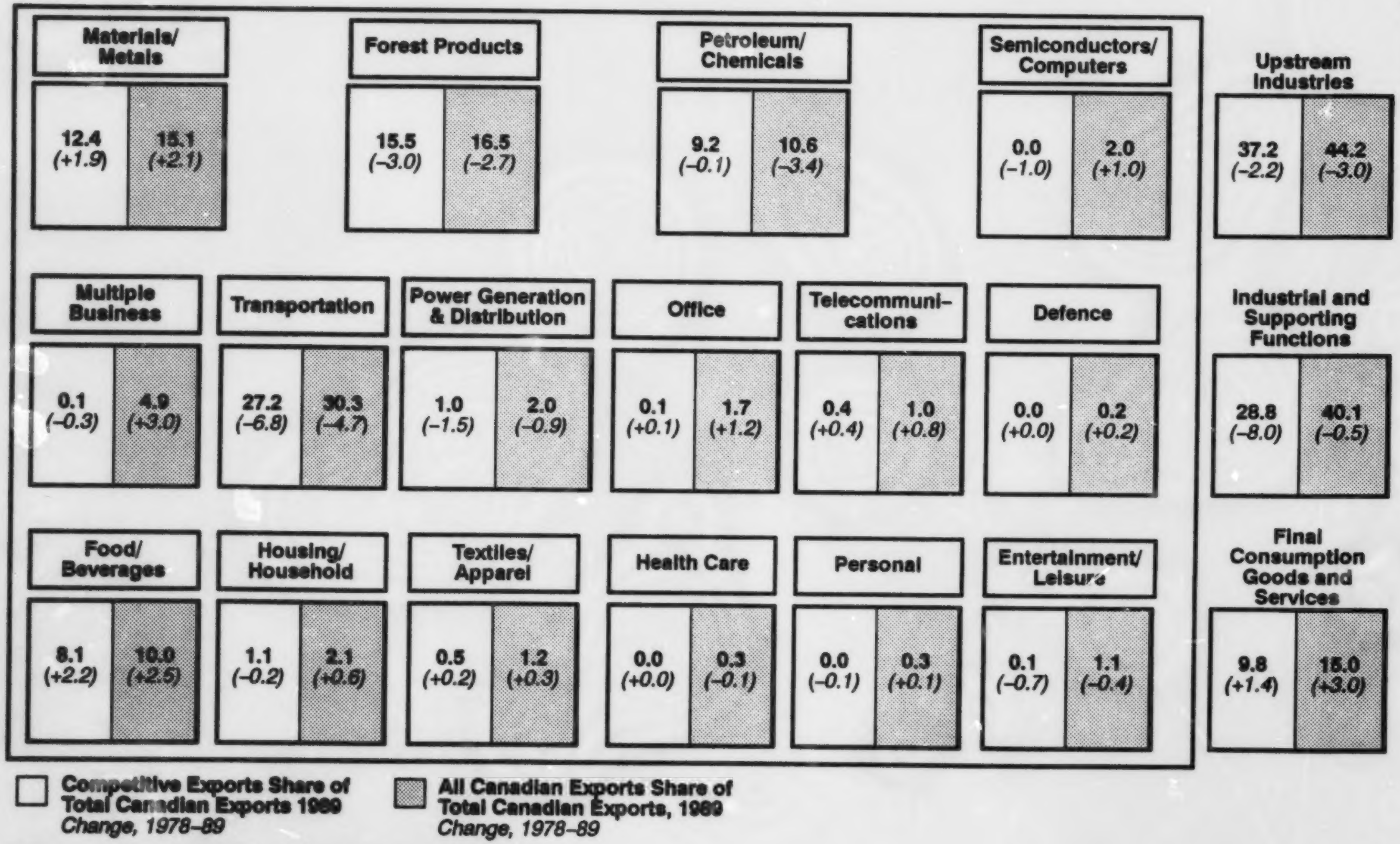
Overall, Canada's competitive exports are found in an even narrower range of industries than its total exports. The five sectors that account for 82 percent of Canada's total exports encompass nearly all (95.5 percent) of its exports of competitive industries.

Figure 2.12 compares Canada's exports of competitive industries in a sector as a percentage of all Canadian exports in that sector. The data confirms that Canada's internationally competitive industries are more skewed toward a few sectors and toward upstream industries than the nation's exports as a whole. In isolating what Canada does best, we discover a small number of industries based on natural resources and the special case of the Auto Pact. This suggests an economy sensitive to shifts in commodity prices, natural resource positions, and changes in trade agreements.

Figure 2.13 shows the share of total world cluster exports accounted for by Canada's competitive industries, compared to eight other industrialized or industrializing nations. The purpose of Figure 2.13 is to paint a broad picture of the patterns of competitive advantage in the nine nations. It reinforces the character of Canadian competitive advantage we have already described.

FIGURE 2.12

CANADIAN EXPORTS OF COMPETITIVE INDUSTRIES RELATIVE TO ALL CANADIAN EXPORTS BY BROAD CLUSTER, 1989



Materials/ Metals	12.4 *(+1.9)*	15.1 *(+2.1)*
Forest Products	15.5 *(–3.0)*	16.5 *(–2.7)*
Petroleum/ Chemicals	9.2 *(–0.1)*	10.6 *(–3.4)*
Semiconductors/ Computers	0.0 *(–1.0)*	2.0 *(+1.0)*
Upstream Industries	37.2 *(–2.2)*	44.2 *(–3.0)*
Multiple Business	0.1 *(–0.3)*	4.9 *(+3.0)*
Transportation	27.2 *(–6.8)*	30.3 *(–4.7)*
Power Generation & Distribution	1.0 *(–1.5)*	2.0 *(–0.9)*
Office	0.1 *(+0.1)*	1.7 *(+1.2)*
Telecommunications	0.4 *(+0.4)*	1.0 *(+0.8)*
Defence	0.0 *(+0.0)*	0.2 *(+0.2)*
Industrial and Supporting Functions	28.8 *(–8.0)*	40.1 *(–0.5)*
Food/ Beverages	8.1 *(+2.2)*	10.0 *(+2.5)*
Housing/ Household	1.1 *(–0.2)*	2.1 *(+0.6)*
Textiles/ Apparel	0.5 *(+0.2)*	1.2 *(+0.3)*
Health Care	0.0 *(+0.0)*	0.3 *(–0.1)*
Personal	0.0 *(–0.1)*	0.3 *(+0.1)*
Entertainment/ Leisure	0.1 *(–0.7)*	1.1 *(–0.4)*
Final Consumption Goods and Services	9.8 *(+1.4)*	15.0 *(+3.0)*

☐ Competitive Exports Share of Total Canadian Exports 1989
Change, 1978–89

▨ All Canadian Exports Share of Total Canadian Exports, 1989
Change, 1978–89

Note: Numbers in italics are changes between 1978 and 1989.
SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

FIGURE 2.13

SHARE OF WORLD CLUSTER EXPORTS OF COMPETITIVE INDUSTRIES BY NATION, 1989

(SELECTED NATIONS ONLY)

Materials/Metals		
Germany	12.5	(−1.4)
Japan	7.6	(−5.9)
U.S.	7.2	(+0.7)
Canada	6.6	(+3.6)
Italy	3.9	(−0.0)
U.K.	2.6	(−0.8)
Sweden	2.5	(−0.1)
Korea	2.3	(+1.5)
Switzerland	1.2	(+0.4)

Forest Products		
Canada	21.9	(+4.8)
U.S.	12.9	(+3.6)
Sweden	10.7	(−1.3)
Germany	2.5	(−1.6)
Italy	1.5	(+0.2)
Switzerland	0.9	(−0.4)
U.K.	0.4	(−0.0)
Korea	0.3	(−1.3)
Japan	0.0	(−0.1)

Petroleum/ Chemicals		
Germany	13.5	(+5.2)
U.K.	7.5	(+4.0)
U.S.	7.2	(+2.8)
Canada	4.8	(+2.6)
Switzerland	1.5	(−0.0)
Italy	1.4	(−1.9)
Japan	1.2	(−0.5)
Sweden	1.0	(+0.6)
Korea	0.7	(+0.6)

Semiconductors/ Computers		
Japan	21.3	(+17.8)
U.S.	7.9	(−24.2)
Korea	5.5	(+2.9)
U.K.	3.8	(−2.3)
Germany	1.5	(−0.6)
Italy	1.1	(+1.1)
Sweden	0.6	(−1.1)
Canada	0.1	(−2.2)
Switzerland	0.0	(−0.5)

Upstream Industries		
Germany	9.4	(−0.3)
U.S.	8.0	(+1.0)
Canada	6.9	(+2.6)
Japan	6.8	(+0.6)
U.K.	4.4	(+1.1)
Sweden	2.8	(+0.1)
Italy	2.2	(−1.0)
Korea	2.0	(+1.4)
Switzerland	1.1	(−0.1)

Multiple Business		
U.S.	20.1	(+12.0)
Germany	14.0	(−11.6)
Japan	7.8	(+0.6)
Switzerland	4.6	(−1.1)
U.K.	4.4	(−7.2)
Italy	3.3	(+0.5)
Sweden	1.0	(−0.2)
Korea	0.1	(+0.0)
Canada	0.0	(−0.1)

Transportation		
Japan	19.1	(+2.8)
Germany	15.6	(−0.2)
U.S.	9.2	(−5.2)
Canada	7.0	(+1.2)
U.K.	2.7	(−3.0)
Italy	1.8	(−0.2)
Sweden	1.5	(−0.5)
Korea	1.0	(+0.4)
Switzerland	0.2	(−0.2)

Power Generation & Distribution		
Japan	14.9	(+0.8)
Germany	14.7	(−3.8)
U.S.	4.7	(−3.5)
Switzerland	2.6	(−1.1)
U.K.	2.2	(−5.8)
Canada	1.6	(−0.9)
Sweden	0.9	(−0.6)
Italy	0.6	(−1.3)
Korea	0.5	(+0.1)

Office		
Japan	19.8	(+5.8)
U.S.	14.0	(−0.2)
Germany	12.6	(−3.8)
U.K.	3.1	(−3.7)
Switzerland	1.2	(−1.3)
Italy	1.1	(−1.0)
Sweden	0.7	(−1.1)
Korea	0.5	(−0.4)
Canada	0.1	(+0.1)

Telecommunications		
Japan	31.1	(+12.6)
U.S.	7.2	(−1.2)
Sweden	5.5	(−1.7)
Korea	3.0	(+2.5)
Canada	1.3	(+1.3)
Switzerland	0.1	(−1.9)
Germany	0.0	(−15.0)
U.K.	0.0	(−5.5)
Italy	0.0	(−0.9)

Defence		
U.K.	42.7	(+27.4)
U.S.	24.8	(−24.5)
Sweden	5.9	(+1.9)
Italy	2.9	(−5.4)
Japan	2.3	(+2.3)
Germany	0.8	(−0.3)
Switzerland	0.3	(−3.6)
Canada	0.1	(+0.1)
Korea	0.0	(−0.1)

Industrial and Supporting Functions		
Japan	16.7	(+2.6)
Germany	14.1	(−3.8)
U.S.	12.1	(−0.7)
Canada	3.7	(+0.2)
U.K.	3.6	(−3.9)
Italy	1.9	(−0.3)
Switzerland	1.8	(−0.6)
Sweden	1.5	(−0.5)
Korea	0.8	(+0.2)

Food/ Beverages		
U.S.	14.3	(−7.1)
Germany	6.1	(+0.6)
Italy	4.8	(+1.2)
Canada	4.0	(+2.5)
U.K.	3.3	(−0.3)
Switzerland	1.0	(+0.0)
Korea	1.0	(+0.1)
Sweden	0.5	(+0.2)
Japan	0.4	(−0.3)

Housing/ Household		
Germany	14.8	(+0.2)
Italy	14.2	(+2.3)
Korea	2.6	(+1.4)
Japan	2.4	(−1.1)
U.K.	2.2	(−3.1)
Sweden	1.6	(−0.7)
Canada	1.4	(+0.4)
Switzerland	0.6	(−0.4)
U.S.	0.4	(−1.7)

Textiles/Apparel		
Italy	13.3	(+0.6)
Korea	9.5	(+3.3)
Germany	7.7	(−1.6)
Japan	3.6	(−2.5)
U.S.	2.8	(−2.3)
Switzerland	2.6	(−1.2)
U.K.	2.0	(−2.1)
Canada	0.3	(+0.2)
Sweden	0.2	(−0.2)

Health Care		
U.S.	14.8	(−10.2)
Germany	14.0	(−0.4)
Switzerland	8.6	(−2.3)
U.K.	8.3	(+0.6)
Sweden	3.3	(+1.0)
Japan	3.1	(+1.4)
Italy	1.2	(−0.7)
Korea	0.3	(−0.1)
Canada	0.0	(+0.0)

Personal		
Switzerland	7.5	(−2.3)
U.S.	7.2	(+0.5)
Italy	5.0	(+0.4)
Japan	4.1	(−0.8)
U.K.	3.6	(−1.2)
Germany	3.2	(+0.3)
Korea	0.8	(−0.2)
Sweden	0.1	(−0.0)
Canada	0.0	(−0.1)

Entertainment/ Leisure		
Japan	20.2	(−2.6)
Korea	6.3	(+4.1)
U.S.	6.0	(−1.5)
Germany	4.7	(−1.0)
U.K.	4.0	(−0.5)
Italy	1.6	(−0.3)
Switzerland	0.2	(−0.3)
Canada	0.1	(−0.6)
Sweden	0.0	(−0.6)

Final Consumption Goods and Services		
Italy	7.8	(+1.1)
U.S.	7.7	(−4.7)
Germany	7.5	(−0.1)
Japan	4.9	(−0.4)
Korea	4.1	(+1.8)
U.K.	3.3	(−1.1)
Switzerland	2.2	(−0.5)
Canada	1.5	(+0.7)
Sweden	0.6	(−0.1)

Note: Numbers in parentheses are changes between 1978 and 1989. Exports are those of competitive industries, not all industries.
SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

Forest Products: The forest products cluster is Canada's most successful in terms of world export share: Canada's competitive industries account for 22 percent of world exports in the cluster. The forest products sector accounts for 16.5 percent of total Canadian exports. More than 90 percent of the exports from this sector (or 15.5 percent of total Canadian exports) are in industries in which Canada has an above average world export share.

Just three industries -- sawn wood, newsprint, and bleached chemical pulp -- account for nearly 75 percent of Canada's forest products exports and 12.4 percent of Canada's total exports. Other competitive industries in the cluster are less sophisticated. These include rough or simply shaped wood, wood chips, simply worked wood such as particle board, simple wood manufactures such as shingles and shakes, and uncoated papers. While Canadian firms do produce some fine papers, their export shares in this and other sophisticated segments are low, and trade balances are mostly negative.

Canada is not internationally competitive in machinery, equipment, or services for the forest products sector. There are some Canadian firms that produce machinery for the sector, but Canada imports far more than it exports.

The Canadian forest products sector maintained its leading world export position and has increased its share of world cluster exports since 1978, primarily through its three dominant industries. Of the nations studied, Canada had the highest share gains. However, the sector displays weak signs of upgrading. In the 1978-89 period, Canadian exports in more sophisticated segments often decreased and trade balances either became negative or deficits increased. For example, the printing and writing paper industry's world export share decreased from 4.9 percent to 3.1 percent with a corresponding shift in the trade balance from a positive $88 million in 1978 to a negative $65 million in 1989. Canada's exports of bulk coated papers similarly declined from a low 1.8 percent in world export share in 1978 to 1.4 percent in 1989, while its trade deficit increased from $14 million to $186 million during the same period. By comparison, Sweden increased its export share in bulk coated papers from 5.9 percent in 1978 to 9.3 percent in 1989 and maintained a positive trade balance. Similarly, during the same period, Canadian exports of parts for paper and pulp manufacturing machinery decreased and the trade balance became negative. Meanwhile the Swedish industry increased its export share and trade balance.

Most of the Canadian forest products sector is controlled by Canadian firms, with foreign firms owning approximately 25 percent of the assets in the industry.

Materials/Metals: Exports of competitive Canadian industries in the materials/metals cluster amount to 6.6 percent of world exports in 1989. The broad cluster as a whole accounts for 15.1 percent of total Canadian exports. Some 83 percent of Canada's exports in this cluster (12.3 percent of total Canadian exports) are in industries with above average export shares. Ores and traditional metals account for most of this cluster's exports. Significant competitive industries include iron/steel powders, unwrought aluminum, non-agglomerated coal and metal slag.

The materials/metals cluster exhibits a pattern similar to that found in the forest products cluster. While Canada does produce and export some finished goods, its competitive exports are predominantly raw materials or partially processed products. Canada's imports in this cluster are more highly processed and are of higher value and margin than its exports. For example, Canada exports unwrought aluminum and aluminum waste and scrap, while it imports finished aluminum products such as plate, sheet, strip, foil, tubes and other manufactures. Iron and steel exports are predominantly pig iron, steel powders, and simple steel coils, while imports include large formed sections, seamless tubes and pipes, and steel plates. On a more positive note, Canada has significant outbound foreign direct investment in the aluminum industry, particularly in the U.S., but also in Europe due largely to Alcan's significant international presence. Except for tunnelling machinery and underground elevators, Canada is not competitive in machinery or equipment related to mining. Exports of construction and mining machinery (which includes tunnelling machinery) decreased from a 4.1 percent export share in 1978 to 3.4 percent in 1989 with a corresponding increase in the trade deficit. With the exception of geophysical contracting, there are virtually no internationally competitive Canadian service industries related to this cluster.

Materials/metals improved its share of world cluster exports since 1978, primarily through increased exports of ores. Canada had the highest overall share gain in this cluster over 1978-89 among all the nations studied although there were few signs of upgrading in this cluster. The nickel industry has upgraded its process technologies. However, in a number of other industries, there were signs of decline. Fabricated copper products such as plates and sheets shifted from a 6.4 percent world export share and a positive trade balance to a 1.7 percent export share and a trade deficit. Similarly, copper tubes and pipes exports decreased with a corresponding decline in export share and the trade balance turned negative. During the same period, exports of unwrought refined copper increased from a world export share of 3.3 percent to 32.9 percent with a positive trade balance of $903 million.

Petroleum/Chemicals: The third significant upstream cluster of competitive Canadian industries is petroleum/chemicals. Canada's competitive industries in this sector accounted for 4.8 percent of world sector exports in 1989. Petroleum/chemicals exports account for 10.6 percent of total Canadian exports. Most of these are competitive industries. Slightly more than 86 percent of exports in this sector are above the cutoff, representing 9.2 percent of total Canadian exports.

Petroleum and natural gas alone account for seven percent of total Canadian exports. Canada's primary strength is in crude petroleum products and basic chemicals such as simple hydrocarbons (for example, styrene and toluene), alcohols and their derivatives (for example, methanol and ethylene glycol), and basic inorganic chemicals (for example, selenium, phosphorus, and ammonia). Canada's position in specialty chemicals is weak.

Crude petroleum products accounted for the slight improvement in Canada's ranking in this sector from fifth to fourth, although there were moderate increases in exports of chemicals. Once-competitive Canadian exports of more processed residual petroleum products and related materials such as bituminous mixtures, mineral tar oils and pitch coke have declined substantially in export value and export share since 1978.[9] This cluster is heavily foreign-owned, with 60 percent of industrial chemicals and 80 percent of other chemical industries under foreign control.

Transportation: The fourth broad competitive cluster, transportation, represents 30.3 percent of total Canadian exports. Competitive industries in the cluster accounted for 27.2 percent of Canadian exports, and seven percent of world exports in 1989. Industries related to the Auto Pact (accounting for 23.8 percent of Canadian exports) dominate Canada's transportation exports, comprising 78.5 percent of all sector exports. Other non-Auto Pact-related competitive transportation industries include vehicles such as aircraft and locomotives, along with some engines, parts and rubber products. Excluding transportation, competitive industries of the industrial and supporting level represent only 16 percent of total exports at this level.

Most of the manufacturing industries in which Canada has an above average export share are related to the Auto Pact. While the size of these industries in Canada was historically driven by this negotiated trade agreement (which, through a number of mechanisms, set a floor for Canadian production), Canadian production has for years exceeded minimum requirements. This was due in large part to favourable wage differentials between Canada and the United States. In recent years, however, this wage advantage has been eroded due to increasing wages in Canada and the migration of U.S. plants to lower wage regions in the South. There is some risk, therefore, that Auto Pact provisions could once again become a determining factor in the level of exports.

There are relatively few competitive related and supporting industries in this cluster. Foreign participants in the Auto Pact have established relationships with non-Canadian suppliers. Most automotive parts and machinery used in the Canadian automobile assembly industry are sourced outside of Canada, resulting in a trade deficit in automotive parts. Unlike the transportation clusters of other major exporters such as Japan, Germany and the U.S., the Canadian transportation cluster does not have any representation in metal working or other machinery industries. There are no competitive Canadian service industries except for transit management and transit system design consulting, which has evolved from Canadian production of urban transit vehicles.

Overall, Canada maintained its fourth position in this cluster over 1978-89, with some moderate share gains. The transportation equipment cluster is dominated by foreign-controlled firms, which represent 75 percent of the industry. In fact, the highest incidence of manufactured exports of U.S.-owned firms in Canada was in transportation equipment.[10] Automotive products also accounted for the highest proportion of intra-firm imports.[11] The high representation of transportation equipment parts among Canada's leading imports indicates an intra-firm trade pattern of importing inputs and machinery from the parent, and exporting assembled products back to the United States.

Food/Beverages: Food/beverages is the only major competitive Canadian cluster among final consumption goods. Competitive industries in this cluster account for four percent of the world cluster exports and 8.1 percent of Canada's exports. Two-thirds of Canada's exports in competitive food/beverages industries consist of fish and grain. Canada's food exports are composed mainly of unprocessed or lightly processed items such as fish, pig meat, unmilled wheat, rape and colza seeds, linseed, and oilcake, and agricultural chemicals including potassium chloride and urea. Canada's weak representation in processed foods declined further between 1978 and 1989 with decreased exports in industries such as uncooked pasta (from 5.6 percent world export share in 1978 to 1.9 percent in 1989), and pastry/cakes (from 2.2 percent to 1.7 percent).

Canada's food cluster contrasts sharply with that of Denmark, another advanced nation with a significant agricultural cluster. Denmark's share of world basic food exports is 4.4 percent, slightly more than Canada's four percent. The food/beverages cluster represents Denmark's leading export cluster, with competitive industries constituting 33 percent of total Danish exports. Yet Denmark's share of world processed food exports is a substantial 6.5 percent, much higher than Canada's 1.5 percent. For example, while Canada's exports include live swine and unprocessed pig meat and offal, Denmark's major pig-related exports are ham, bacon, sausage and other prepared and preserved pork. Denmark's food cluster also includes a significant export presence in dairy machinery, food processing machinery, and refrigeration equipment.

Italy also has a strong food sector. Its share of the world basic food exports is 4.2 percent, similar to Canada's. However, Italy's competitive industries have also achieved a higher share in the world's exports of processed food (3.3 percent compared to Canada's 1.5 percent), edible oils (4.5 percent versus Canada's 2.1 percent) and beverages (8.6 percent versus Canada's 2.2 percent). The Italian food sector has developed from positions in pasta, olive oil, and wine into branded packaged foods, wine-making and other food processing equipment, resulting in a substantial 15.5 percent share of the world food machinery exports. By comparison, Canada's competitive machinery industries -- such as cultivators and weeders, ploughs, soil preparation machinery, and poultry-keeping machinery -- have only a 1.3 percent share.

Unlike Denmark and Italy, which have upgraded to compete in the differentiated foods and beverages, Canada has tended to remain in basic foods. Although Canada commands very high shares of world exports in grain, for example, it imports more prepared cereal than it exports. Indeed, the slight improvement in Canada's position in the food/beverages cluster resulted from increased exports in grain.

Food/beverages is the only broad cluster in which Canada has a representation of competitive machinery industries. Included in this cluster is agricultural equipment such as ploughs, weeders and seeders. Canadian exports of smaller agricultural implements command higher export shares, however, than in larger, higher value combines and harvesters, where Canada's imports exceed its exports. Canada produces food processing machinery, but has a low export share and negative trade balances.

Overall, the food/beverages cluster in Canada is 34 percent foreign-controlled. However, foreign control tends to be more prevalent in the processed foods segment such as fruit and vegetable canning and soft drinks, while the dairy and fish products segments are predominantly Canadian-controlled.[12] Recent foreign acquisitions within the meat packing industry have increased foreign control in that sector.

iii) Isolated Successes in Other Clusters

Canada has achieved limited international success outside the five sectors just described. Pockets of strength are found in telecommunications (due primarily to Northern Telecom's positions in central office switches and line telephone equipment) and power generation and distribution (related to Canada's hydroelectric resources and its metal and pulp industries, which are intensive users of power). Canada has only limited international positions in semiconductors and computers, multiple business, office products, defence goods, and non-food final consumption goods and services.

In semiconductors/computers, another cluster with significant foreign control, Canada has a limited export presence. Even though total semiconductor/computer cluster exports have increased slightly since 1978, those from competitive industries declined. Imports of computer-related products overwhelm exports by a wide margin. Canada's relative position in computers improved between 1978 and 1985, climbing to third versus other nations studied. However, by 1989, its position had slipped to eighth.

Canada shows few signs of developing clusters of competitive industries that are not based on resources. Many of Canada's manufacturing industries are having difficulties sustaining export share. Particularly noteworthy is multiple business, accounting for five percent of total Canadian exports -- of which only a fraction comes from competitive industries. While multiple business exports have increased, those from competitive industries have fallen and Canada's imports far exceed exports. There are few industries above the cutoff in this cluster. Those that are include mainly instruments and apparatus such as optical radiation instruments, flywheels and gas meters. Industries that have increased exports, though their trade deficits have also increased, are clustered around parts and assessories for tools, apparatus and machinery. Once-competitive industries such as central heating equipment, glass articles and manufactured non-ceramic mineral articles lost substantial export share as well as absolute export value over the past decade.[13] Canadian firms are facing difficulties gaining and maintaining a presence in this sector, which is comprised of manufactured goods that serve a wide range of other industries. In the office products sector, Canada has an international presence in business forms driven in large part by a high degree of outbound foreign direct investment.

Canada's representation in final consumption goods has been consistently weak. Examples were found of once-competitive industries such as sound equipment parts ($149 million export value and 18.8 percent export share in 1978) which almost completely vanished by 1989 ($6 million export value and 0.2 percent export share). In the housing and household cluster, Canada exports some wood-based products, such as wallpaper, manufactured housing and construction materials. Of these, crude asbestos registered the largest increase in export share. Competitive Canadian textiles/apparel exports consist mainly of hides, fur skins, and leather, which together represent 63.8 percent of the competitive textiles/apparel cluster exports.[14] Canada's largest competitive industry in the personal product category is matches (48.4 percent of competitive cluster exports) linked to forest products. In the entertainment/leisure sector, a few industries clustered around movie-making have become significant exporters: developed 35mm cinema film, cinematographic projectors and projector parts. Through outbound foreign direct investment Canada also has a significant presence in newspapers, particularly in the United States.

iv) Competitiveness in Unprocessed Specialty Inputs

Within each broad cluster, internationally successful industries can be further grouped by vertical stage. The first level consists of primary or finished goods, the second of machinery used in producing them, and the third of specialized inputs to the goods. Services associated with the goods or their production comprise the fourth level. This way of grouping industries permits an examination of the vertical relationships among competitive industries and the depth of national clusters, as illustrated for the Canadian forest products cluster in Figure 2.14.

Figure 2.14

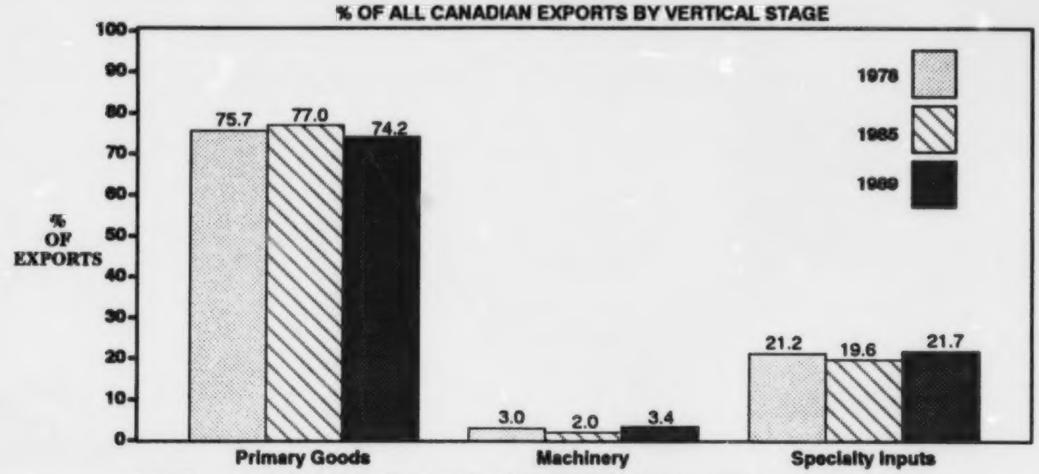
	CANADIAN COMPETITIVE FOREST PRODUCTS CLUSTER		
	Wood Products	Paper	Pulp
Primary Goods	**WOOD, CONIFER, SAWN** Wood, conif, rough, untreated *Wood rough painted, preserved* **WOOD, CONIF, WORKED,SHAPED** **WOOD CHIPS, CONIFER** Wood chips, non–conifer. Hoopwood; split poles; etc. *Plywood, soley wood, other* *Fibreboard, dens0.5–.8g/cm3* *Non–conifer. veneer, etc.* *Coniferous, veneer, etc.* *Particle board, etc. wood* Casks, barrels, etc. staves *Other articles of wood* **SHINGLES AND SHAKES**	**NEWSPRINT, ROLLS, SHEETS** *Oth. paper, brd, 40–150g/m2* **OTHER PAPER, BOARD, UNCOATED NES** *Sack kraft paper, uncoated* Kraft paper, unct<150g/m2 *Semi–chem. fluting paper* Toilet tissue stock, etc. **PAPER,PAPERBOARD, TARRED, ETC.** Gummed paper, strip, rolls Filter paper, paperboard	**CHEM.WOOD, PULP, CONF.BLEACHED** **CHEM. WOOD, PULP, SULP. BLEACHED** *Chem. wood, pulp, dissolvng* *Chem. wood pulp, n–conif,b* **CHEM. WOOD PULP, SULP. UNBLEACHED** *Chem. wood pulp, conifer* **SEMI–CHEM. WOOD PULP** **MECHANICAL WOOD PULP** Waste *Waste, paper (newsprint)* *Sawdust, wood waste, scrap* Wood-based Chemical Products *Residual lyes from wood pulp*
Machinery	**CHAIN SAW BLADES** *Cellulose pulp mfg. machinery*		
Specialty Inputs	**CHLORINE**		
Services			

Key

Modern font	5.1% export share or higher, but less than 10.3% share
Modern Italics	*10.3% export share or higher, but less than 20.5% share*
MODERN BOLD	**20.5% EXPORT SHARE OR ABOVE**

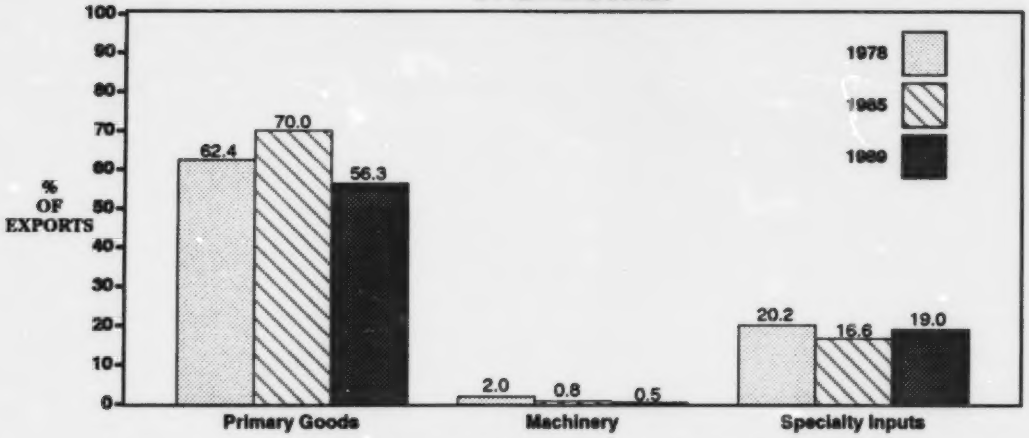
Figure 2.15 displays all Canadian exports by vertical stage while Figure 2.16 presents comparable data for competitive Canadian industries. Roughly three-quarters of Canadian exports in 1989 consisted of primary goods, 22 percent were specialty inputs, and less than 4 percent were machinery. The proportion of exports accounted for by competitive industries differs markedly by vertical stage: 75.9 percent of exports of primary goods industries are from competitive industries, as are a very high 87.6 percent of exports of specialty inputs industries. In contrast, only 14.7 percent of machinery exports are from competitive industries.[15] While Canadian exports of machinery industries have increased very slightly since 1978, most exports are either relatively low in value and world export share, or trade balances are negative. Exports from competitive industries have fallen dramatically from 53.8 percent of all machinery exports in 1978 to 14.7 percent in 1989. Canadian primary goods and specialty input industries which are resource-based have been able to sustain their export share, while machinery industries, which typically compete on technology, have slipped.

Figure 2.15
% OF ALL CANADIAN EXPORTS BY VERTICAL STAGE



SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

Figure 2.16
% OF CANADIAN EXPORTS OF COMPETITIVE INDUSTRIES BY VERTICAL STAGE

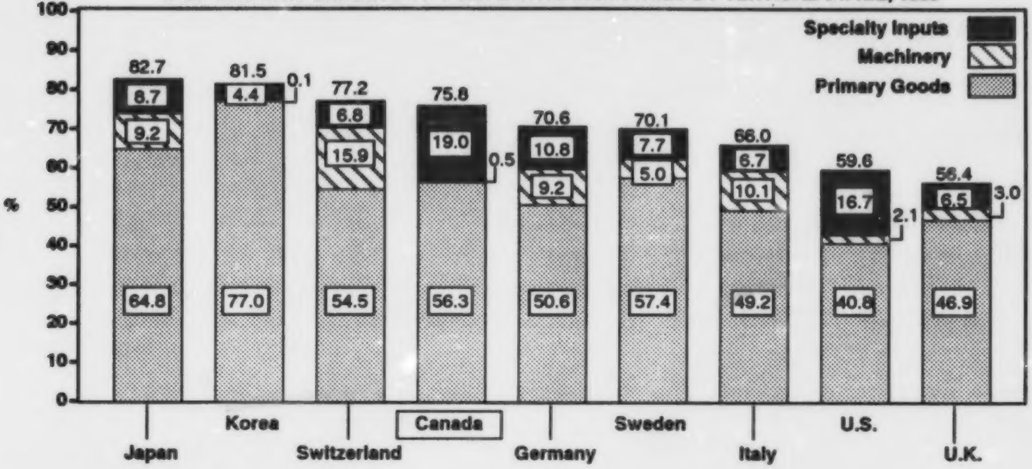


SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

Figure 2.17 compares exports by stage among countries. Like the other nations represented in this figure, Canada's exports come primarily from its competitive primary goods industries. Exports of Canada's competitive specialty input industries, however, account for 19 percent of the nation's total exports, a high percentage compared to 16.7 percent for the United States, 10.8 percent for Germany, and 7.7 percent for Sweden. Specialty inputs typically constitute inputs into the primary goods produced within the sector. However, in Canada's case, its specialty inputs are mainly unprocessed resource-based inputs, and it lacks competitiveness in the corresponding end-products. Canada's position in specialty inputs reflects its strength in unprocessed resource-based products, such as ores and grain, whereas other advanced nations are represented by significant exports of industrial parts and components. (Figure C in the Appendix presents a detailed summary of Canadian exports by vertical stage within each sector.)

Figure 2.17

% OF COUNTRY EXPORTS OF COMPETITIVE INDUSTRIES BY VERTICAL STAGE, 1989



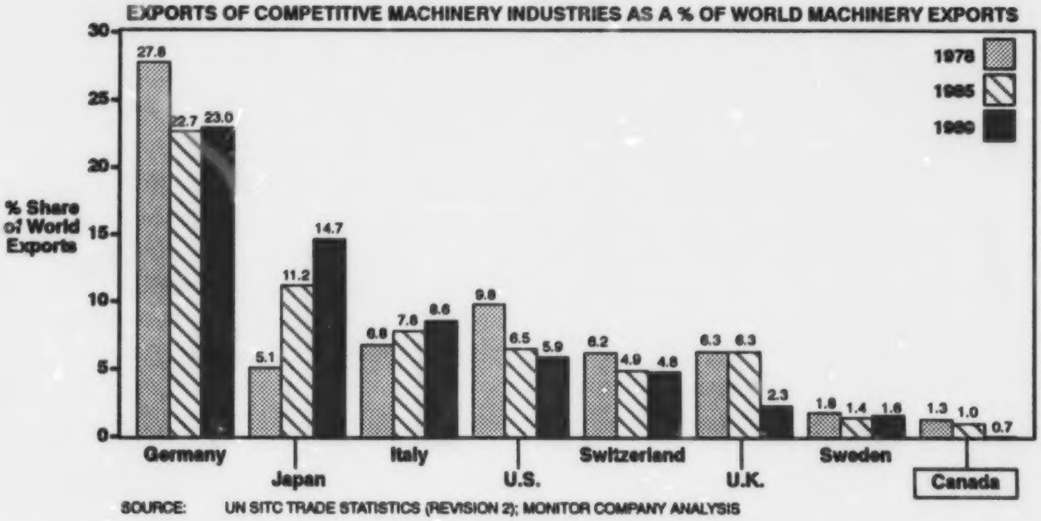
SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

v) Few Machinery Exports

Based on the export share cutoff criterion, Canada has virtually no competitive machinery industries. In total, machinery exports accounted for 3.4 percent of total Canadian exports in 1989, of which only 14.7 percent were above the cutoff. From 1978 to 1989, Canada's overall trade deficit in machinery increased by 31 percent in real terms to $3.3 billion. Canada's small 1.3 percent share of competitive world machinery exports in 1978 had dropped to 0.7 percent by 1989. Figure 2.18 compares eight nations' share of competitive world machinery exports. Canada is at the bottom.

Figure 2.18

EXPORTS OF COMPETITIVE MACHINERY INDUSTRIES AS A % OF WORLD MACHINERY EXPORTS



SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

With few competitive machinery exports, Canadian industries are deprived of the dynamic interactions between customers and home-based machinery manufacturers that foster process innovation and industry upgrading. Sweden, in contrast, has a more balanced representation at all vertical stages, including machinery. In particular, it has enhanced its strength in forest products through superior performance in machinery. Italy's strong performance in machinery (8.6 percent world export share) was a key driver of the post-war Italian economy. Italy's process technology enabled it to offset rising wages.

Machinery industries are often an indication of healthy upgrading because they allow a country's industries greater control over process technologies. The nations that have improved productivity the fastest have expanding machinery exports. Superiority in machinery and in related and supporting industries helps sustain advantage in primary goods. Primary goods producers can often work closely with machinery firms based in their home country to upgrade and improve productivity. This type of close relationship is more difficult to build and maintain with foreign suppliers.

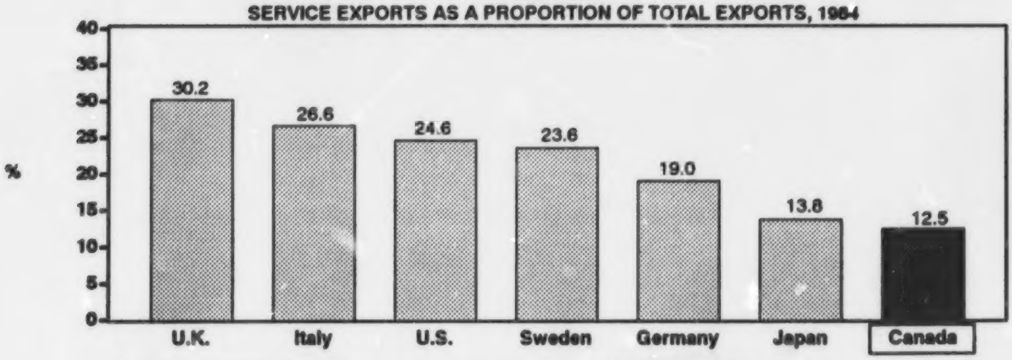
Expertise in one machinery industry often spills over to related machinery industries, which can lead to new business formation. The ability to compete in a range of machinery industries, first domestically and then globally, signals the presence of a capability for process innovation. Such spillovers have contributed, for example, to Sweden's strong performance in the multiple business and health care clusters, and to a lesser extent in the power generation and distribution and telecommunications clusters.

vi) Few Internationally Competitive Services

Services represent approximately two-thirds of Canada's GDP, second only to the U.S. among G7 nations. A high service share of GDP is associated with Canada's high per capita income. However, while services are a significant input to all goods exported, few industries in Canada's services sector have achieved international standing. Figure 2.19 displays service exports as a proportion of total exports of selected nations. Canada's share is the lowest among those profiled.

Figure 2.19

SERVICE EXPORTS AS A PROPORTION OF TOTAL EXPORTS, 1984



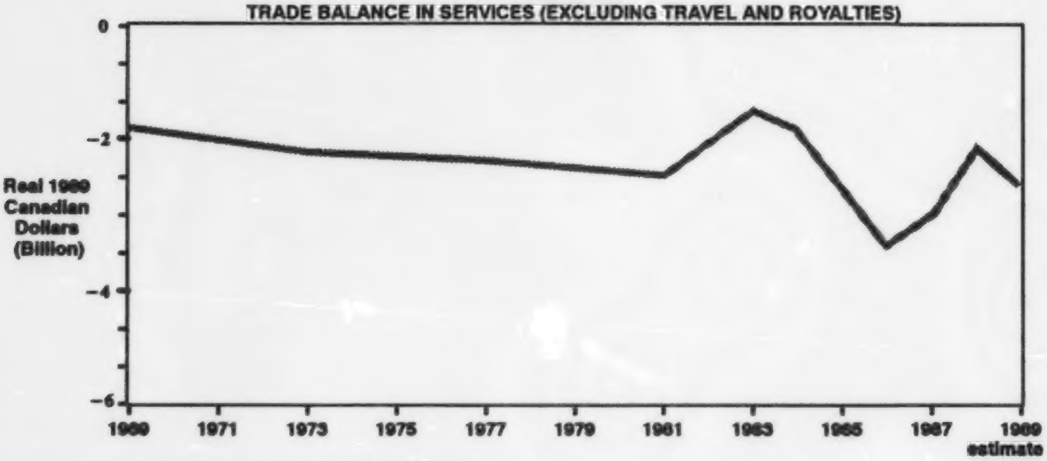
SOURCE: ECONOMIC COUNCIL OF CANADA, EMPLOYMENT IN THE SERVICE ECONOMY (1991)

Community, business and personal services represent Canada's largest service sector, accounting for 23 percent of GDP in 1990. The finance, insurance and real estate sector is the second largest, comprising 8.1 percent of GDP. Of this, life insurance and banking are the only major industries with a significant international presence. Apart from life insurance, banking, and the service industries related to specific clusters that were mentioned earlier, consulting engineering is the only other Canadian service industry we were able to identify with a strong international position. It is closely linked to Canada's mining and construction industries. Not only are there few world-class Canadian service industries, but Canada has a negative trade balance in services (excluding travel and royalties payments), which has trended downward since the 1970s (see Figure 2.20). However, consulting and other professional services were two categories in business service that showed a surplus in 1989.

While a weak international position in services is not bad *per se*, it is a sign that the productivity of Canada's service industries may be lagging. Representing such a large part of the economy, an inefficient service sector can become a drag on national income.

Figure 2.20

TRADE BALANCE IN SERVICES (EXCLUDING TRAVEL AND ROYALTIES)



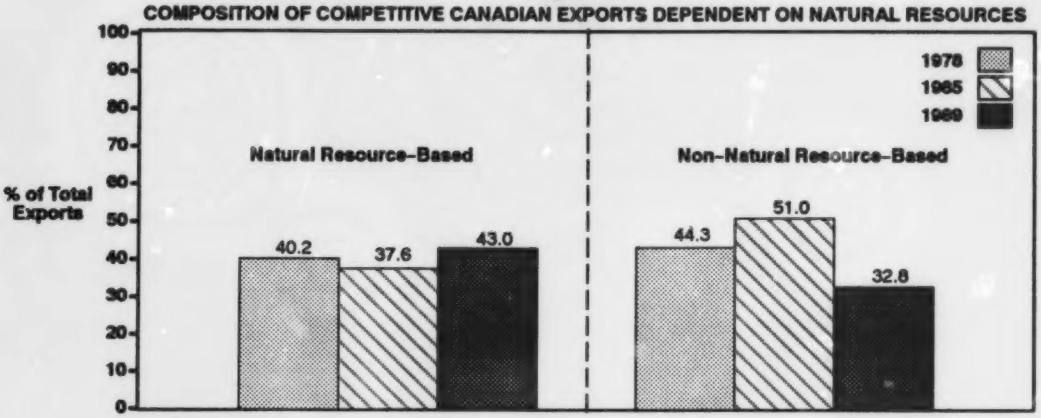
SOURCE: STATISTICS CANADA BALANCE OF PAYMENTS

vii) Signs of Eroding Competitiveness Outside of Natural Resource Industries

Canada's overall mix of exports has remained consistent over the recent past, with resource-dependent industries maintaining a 45 to 46 percent share of total exports between 1978 and 1989. The proportion of total exports accounted for by competitive industries, however, has fallen since 1978. Overall, Canadian exports of competitive industries have declined as a proportion of its total exports from 88.6 percent in 1985 to 75.8 percent in 1989.

Most of this loss was from non-natural resource-based industries, as seen in Figure 2.21 (the increase in non-resource-based exports in 1985 was largely due to Auto Pact industries). While Canada has so far been able to sustain its competitiveness in natural resources, it has lost ground in exports of manufactured goods. Competitive non-resource industries represented 2.1 percent of world exports in 1978. This rose to 3.4 percent in 1985 and has since declined, to 1.8 percent in 1989.

Figure 2.21
COMPOSITION OF COMPETITIVE CANADIAN EXPORTS DEPENDENT ON NATURAL RESOURCES



SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

D. Worsening Trade Balances Outside of Resource-Dependent Clusters

Four out of Canada's five dominant export sectors enjoy positive trade balances. In upstream industries, Canada's strength is reflected in its growing positive trade balance in these industries, reaching $23 billion in 1989 (in U.S. dollars), up from $9 billion in 1978. Underlying this increase is the growth in the trade surplus of the forest products sector (to $16 billion), and in the materials/metals sector (to almost $8 billion).

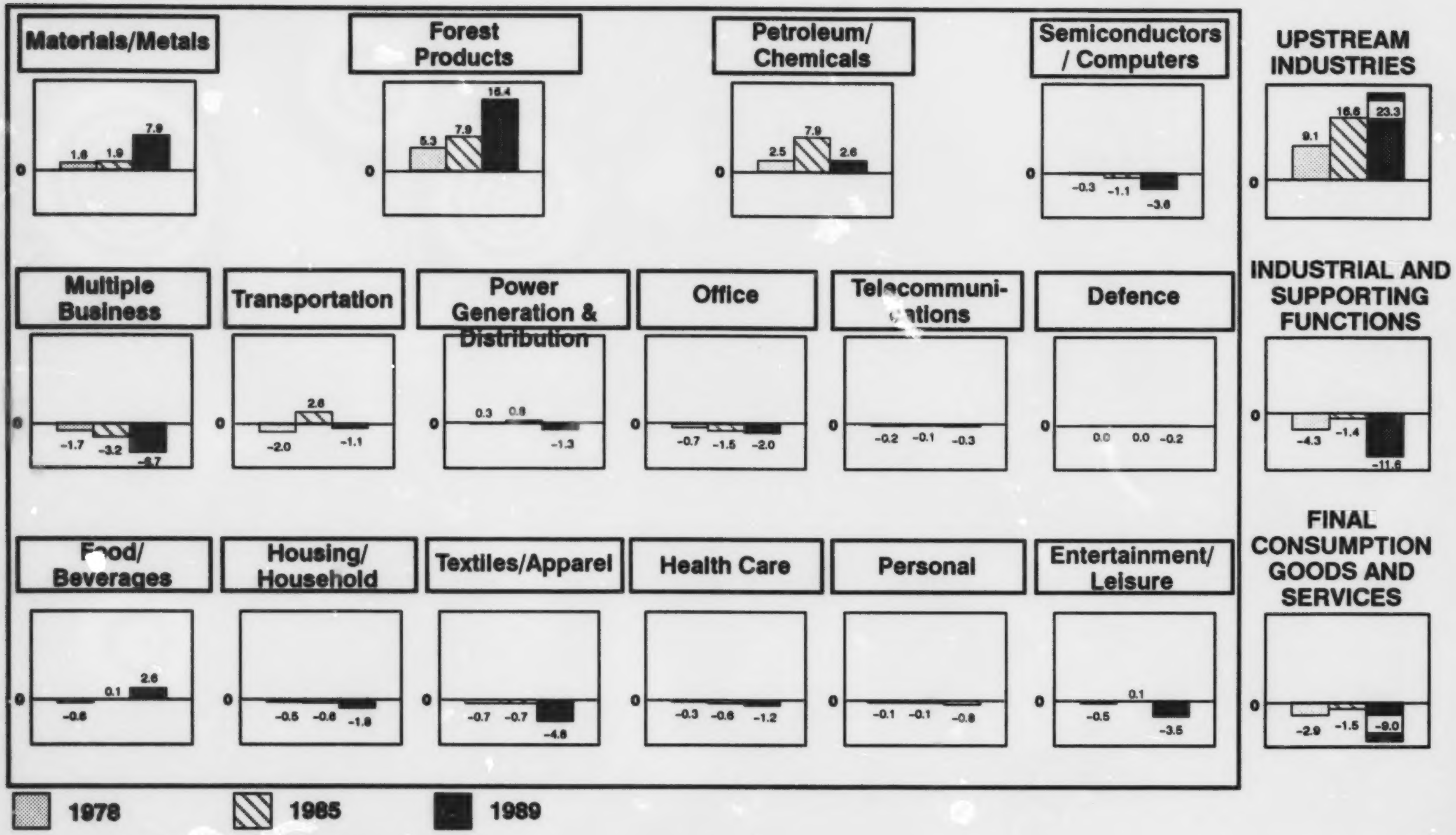
Figure 2.22 displays Canada's trade balances by broad cluster. Petroleum/chemicals continues to generate a positive trade balance, which peaked at $8 billion in 1985 and fell to $2.6 billion in 1989. Food/beverages is the only final consumption goods sector with a positive trade balance. Of the five main export sectors, the only one with a negative trade balance is transportation, which fell back into deficit after experiencing a surplus in 1985.

The other upstream cluster, semiconductors/computers, shows a steady decline, widening from a $0.3 billion deficit in 1978 to $3.6 billion deficit in 1989. Industrial and supporting industries have registered a growing trade deficit, reaching $11.6 billion in 1989. The power generation and distribution sector had a negative trade balance in 1989 after recording surpluses in previous years. All other broad clusters in this group have consistent negative trade balances. Multiple business continues to register a large trade deficit, and had the distinction of registering Canada's largest cluster deficit at $6.7 billion in 1989. The trade balance in final consumption goods remains negative and has deteriorated. All the clusters comprising manufactured goods show continuing trade deficits.

Overall, Canada has growing trade surpluses in resource-dependent goods and growing trade deficits in non-resource dependent goods.[16]

The rising trade deficit in most of Canada's non-resource dependent industries points to weaknesses in upgrading in many of them. Imports are fulfilling Canadian demand in a growing range of sophisticated segments. Although this is not necessarily inconsistent with productivity growth and maintaining Canada's standard of living, it means we must look carefully at Canada's resource industries to assess their capacity to sustain wages and profits.

FIGURE 2.22
CANADIAN TRADE BALANCE BY BROAD CLUSTER



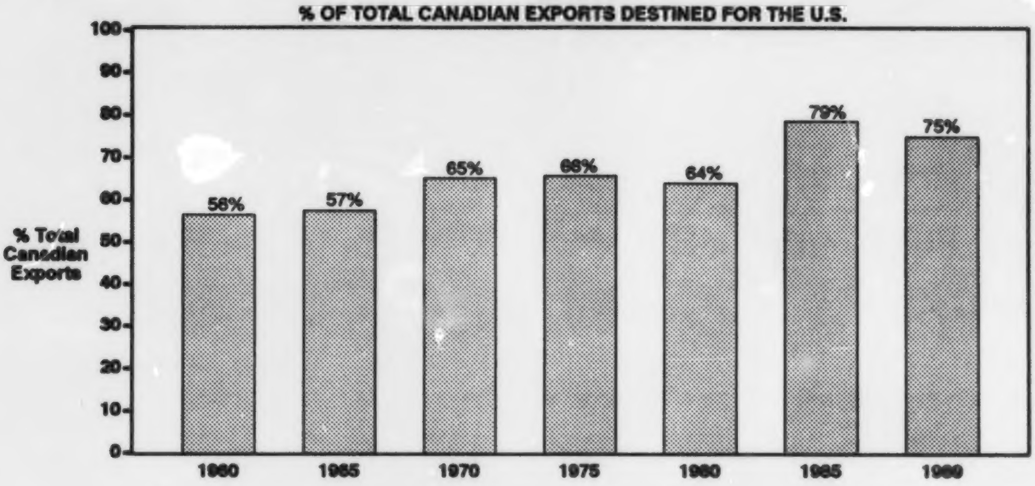
Note: Trade is measured in US$ (billions)
SOURCE: UN SITC TRADE STATISTICS (REVISION 2); MONITOR COMPANY ANALYSIS

E. Reliance on the U.S. Market Has Increased

Canada's reliance on the U.S. as an export market has grown since the 1960s, as shown in Figure 2.23. In 1989, Canada shipped 75 percent of its exports to the United States. In contrast, 56 percent of Switzerland's exports went to the EC, a neighbouring market roughly the size of the United States.

Figure 2.23

% OF TOTAL CANADIAN EXPORTS DESTINED FOR THE U.S.



SOURCE: BANK OF CANADA REVIEW

Canada's exports to the U.S. consist primarily of products that do not appear on the American economy's list of competitive industries. This suggests that Canada does not compete directly with the U.S. in many of its competitive export industries, and that Canadian production may be complementary to U.S. production. For example, of the 34 transportation industries in which more than 75 percent of Canadian exports go to the U.S., only six are common to both nations' competitive transportation clusters. Of 38 petroleum/chemicals industries, only ten are common.

One sign of a truly competitive industry is sustained exports to many countries because this signals more robust competitive advantages. Canada has few such industries, and its exports thus appear to rely significantly on transportation cost advantages (see Figure D in the Appendix, which displays all the competitive Canadian industries with at least 25 percent of exports going to countries other than the U.S.). When industries with exports to the U.S. above the average 75 percent figure (1989) are excluded from the list of Canada's competitive industries, the remaining industries are predominantly ores, pulp, grain and hides.

Since the U.S. is a large and often sophisticated market, Canadian exports to the U.S. carry some positive messages about industry competitiveness. However, the lack of diversified markets for Canadian exports is a sign of potential fragility in its competitive position and ties Canada closely to the economic developments in one other economy.

F. Foreign-Controlled Firms Have Greater Participation in Trade than Canadian Firms

The large share of Canadian exports to the U.S. is partly explained by the high volume of cross-border intra-firm trade. The majority of Canadian trade in manufactured goods originates from foreign-controlled firms, which have a higher propensity to both export and import than Canadian firms. They accounted for 61 percent of Canadian manufactured exports and 64 percent of imports in 1984.[17] More than half of these imports were intra-firm trade, compared to only 9.8 percent of imports of Canadian firms which were intra-firm (see Figure 2.24). Among U.S.-controlled firms, 83 percent of exports were to their companies.[18]

The highest proportion of intra-firm imports was in automotive products.[19] Transportation equipment also accounted for the highest incidence of manufactured exports of U.S.-owned firms.[20] The high proportion of transportation equipment parts among Canada's leading imports indicates a pattern of importing inputs and machinery from the parent, and exporting assembled products back to the United States.

Figure 2.24

CANADIAN TRADE BY COUNTRY OF CONTROL OF EXPORTER AND IMPORTER, 1984*

	COUNTRY OF CONTROL			TOTAL
	CANADIAN	FOREIGN (Including U.S.)	U.S. ALONE	
Total Imports (%)	28.7	63.8	50	100.0
Imports / Shipments (%)	4.3	25.2	26	10.9
% of Imports due to Intra-firm	9.8	54.3	50	37.9
Total Manufactured Exports (%)	38.9	61.1	50	100.0
Exports / Shipments (%)	21.3	35.4	30	28.1

*(Latest available data)

SOURCE: Jahingar Alam, Shui-You Li and Rudy Oldenburg, *Analysis of Performance of Multinational Enterprises*, Draft (October 1989)

As can be seen, most manufactured goods production has historically been destined for domestic consumption. Exports, when present, have been modest and often destined for parent companies. Consequently, Canada imports more advanced technology and higher margin goods while it exports modestly processed resources and low technology products.

Whether this pattern can and will persist, while maintaining Canada's standard of living, is a critical question to which we will return. Flows of intra-firm trade can be strongly affected by locational choices of multinationals, and we must investigate how these choices are being made in response to changing competitive circumstances.

G. Four Broad Categories in Canada's Export Economy

Analysis of Canada's trade patterns suggests another way of portraying the Canadian export sector. Here we divide the export sector into four broad categories:

i) Resource-based Industries: industries where Canadian exports were derived from natural resource advantages, as previously described.

ii) Market access-driven Industries: industries where Canadian exports emanate from plants established typically by foreign companies primarily to gain access to the Canadian market. It was difficult to identify statistically all the industries where foreign investment was driven by market access considerations. Indicators used to identify these industries were a high share of assets controlled by foreign companies, and/or historically high tariffs. Auto Pact industries represent approximately 60 percent of shipments in this category. (It is important to note, however, that the bulk of Canada's production of automobiles is exported to the U.S., not sold domestically.) Other industries included rubber products, commercial refrigeration, office and business machines, electrical appliances, and some areas of industrial chemicals.

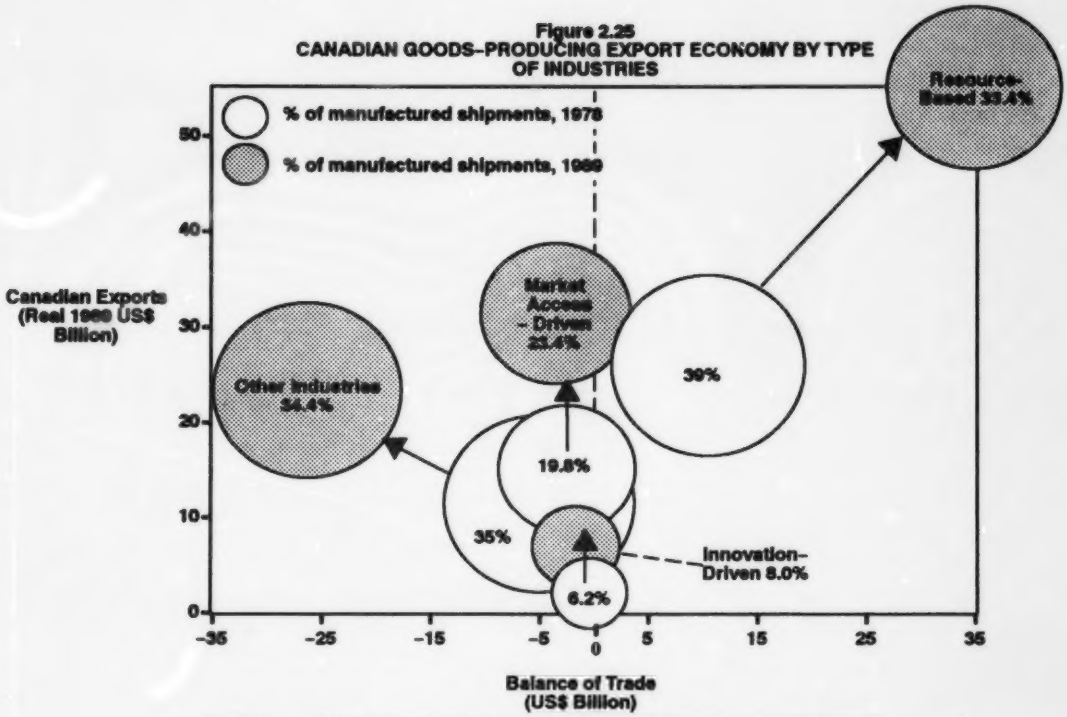
iii) Innovation-driven Industries: defined as either (predominantly) Canadian-owned industries or foreign-owned industries where competitiveness has been driven largely by Canadian-based innovation. Manufacturing industries in this category included telecommunications equipment, aircraft and aircraft engines, and electronic components.

iv) Other Industries: represent the balance of the export sector. These industries had low export shares and were generally uncompetitive or marginally competitive by our definition. They are most likely foreign-controlled industries or indigenous industries involved in trade with bordering states of the United States. In the latter case, exports are a reflection more of proximity to relatively isolated parts of the U.S. rather than of robust underlying competitive advantage.

To approximate how Canadian exports are divided by categories, we employed UN trade data. Unfortunately, this data covers manufacturing but not services. Canadian manufacturing industries were classified using these categories, and the industries in each category were aggregated (as measured by shipments).[21]

Figure 2.25 displays the trends by categories in terms of exports and balance of trade. These estimates are crude, but they are consistent with earlier data. As can be seen, the most significant growth in Canadian goods exports was from the resource sector, which represented 33 percent of Canadian manufactured shipments in 1989. Canada's resource-based sector is by far the strongest part of the economy and enjoys the highest exports and biggest trade surplus. It has markedly increased its exports as well as its trade surplus since 1978.

Figure 2.25
CANADIAN GOODS-PRODUCING EXPORT ECONOMY BY TYPE OF INDUSTRIES



SOURCE: UN SITC TRADE STATISTICS; STATISTICS CANADA; MONITOR COMPANY ANALYSIS

Market access-driven industries represent the next highest volume of exports. While they have registered an increase in exports, the category as a whole continues to have a negative trade balance. Innovation-driven industries, where some truly competitive indigenous Canadian industries are found, remain the smallest group. Its share of manufactured shipments has increased somewhat since 1978. However, this group has the lowest volume of exports and its trade balance is slightly negative and decreasing modestly.

Other Canadian goods industries comprise 34 percent of manufactured goods shipments. Some of these industries may actually be market access-driven. The size of this group is troubling, because these industries tend to be only marginally competitive, or are uncompetitive. While exports have increased, imports have increased much faster and the trade balance has deteriorated sharply. This trend is consistent with the growing internationalization of competition and the increasing exposure of Canadian industry to international competition, which tends to affect such industries first.

Again the pattern here is consistent with previous analysis: resource-based exports represent the driver of the export economy with increasingly negative trade balances in other sectors. This categorization of the Canadian economy is an important one to which we will return in later chapters as we examine the threats to Canada's competitive position.

2. SUMMARY

Resource industries comprise 45 percent of Canadian exports, and Canada has by far the highest share of country exports based on unprocessed resources of the nations studied. This pattern has continued and has, in fact, been consolidated as other advanced nations have reduced their reliance on unprocessed resources. Within its strongest resource clusters, Canada often imports more processed, higher value products.

Canada has a true international presence in only five sectors, which account for more than 82 percent of total Canadian exports. It continues to rely heavily on upstream industries. The sprinkling of export share gains elsewhere was also derived primarily from resource-based industries.

While Canada has sustained and increased its position in natural resource-based industries since the late 1970s, it has suffered a troubling loss of position in the non-resource sector. The pattern is not important for its own sake -- no industry is inherently better than another. Rather, what is important is the signal it provides about the underlying health of the process of upgrading productivity in the Canadian economy. Canada also has few competitive machinery industries, one of the critical drivers of the upgrading process, and continues to lose share.

Few Canadian clusters show signs of increasing depth or breadth that would signal the capacity to enhance productivity by moving into new segments or related industries. Even in Canada's best internationally positioned cluster, forest products, there were few signs of robust upgrading. Exports in more sophisticated segments such as fine papers decreased and trade deficits in these segments and machinery increased. Canada has only a handful of competitive manufacturing industries outside of transportation, where Auto Pact industries dominate. In fact, Auto Pact industries represent the dominant share of Canada's exports of manufactured goods, representing nearly a quarter of all Canadian exports. The Auto Pact has served to increase productivity and rationalize automotive assembly facilities in Canada, and also to expand parts production. However, the fact that Canada is not a home base for the assembly companies has inhibited the development of related and supporting industries in this cluster. Even though the transportation cluster was Canada's leading export sector, it experienced a trade deficit in 1989.

Canada's exports are overwhelmingly shipped to the U.S. (75 percent) and reliance on this one market has increased over time. Much of this trade, especially exports of manufactured goods, takes the form of intra-firm trade. In fact, foreign-controlled firms exhibit a higher propensity to both export and import than Canadian firms. This suggests the absence of a broad international outlook on the part of many Canadian firms.

Overall, the importance of the data surveyed in this chapter lies in what they tell us about the process of adjustment and productivity growth in the Canadian economy. A pattern of weak upgrading, even in Canada's strong export clusters, is a cause for concern.

There is little evidence that Canada's competitive clusters are deepening, broadening or multiplying. Taken together, this evidence is consistent with the brief macroeconomic picture presented in Chapter 1, which points to an economy that shows limited signs of upgrading and suggests that productivity growth -- the critical driver of prosperity -- may be difficult to achieve.

CHAPTER 3

DETERMINANTS OF NATIONAL COMPETITIVE ADVANTAGE

National competitiveness has emerged as a preeminent issue for firms and governments in every nation.[1] Most efforts to explain national competitiveness have taken an aggregate perspective, focusing on overall factor endowments, macroeconomic conditions, or broad characterizations of government policy. None of these traditional approaches, however, provides a complete and compelling explanation of why entire economies advance, nor why a nation's firms succeed or fail in particular industries.

Patterns of international trade have traditionally been explained using the concept of comparative advantage. The most widely used variant of this theory in the postwar period has been the factor proportions model. This model starts with the premise that all nations employ equivalent technologies but differ in their endowments of so-called factors of production, such as land, labour, infrastructure, natural resources and capital. Factors of production are the basic inputs firms draw upon. Nations gain advantage in those industries that make the most intensive use of the productive factors they have in abundance. Therefore, nations with significant pools of low-cost labour will export labour-intensive products, while those with rich endowments of natural resources -- such as raw materials and arable land -- will export products drawing on them.

Traditional comparative advantage arguments help to explain trade in some industries, especially in commodity industries involving modest skill or technology. There has been a growing realization, however, that the traditional comparative advantage theory is no longer sufficient to explain the patterns of trade in modern international competition. Much of world trade takes place between nations with broadly similar factor endowments, and there is a large and growing volume of trade in goods and services that require roughly similar factor proportions. It is also evident that many nations have achieved a level of economic development that provides them access to a broad range of industries. Advanced, knowledge-intensive industries where comparative advantage no longer applies are becoming an increasingly important part of world trade.

Competition is becoming increasingly global. Increasingly, firms are adopting a more global perspective when making decisions about where to source raw materials and other inputs, to manufacture, to perform R&D, and to sell their products or services. This has the effect of decoupling the firm from the factor endowments of a single nation. Raw materials, components, machinery and many services are available to firms in most nations via global markets. Thus the success of a firm is less dependent on the endowments of factors in its home nation than ever before. Instead, success increasingly depends on the efficiency and effectiveness with which firms deploy them.

With the trend toward industry globalization, one might be tempted to think that the nation has lost its role in influencing the international success of its firms. Some observers have even suggested that nations have become irrelevant. However, results from the ten-nation study strongly refute this view. There have been striking differences in the economic performance of nations in the postwar period. Leading international competitors in particular fields are normally based in one or two nations. Indeed, they are often based in the same city or region within the nation. National positions in industries are often surprisingly stable, stretching over many decades and in some cases much longer. This suggests that competitive advantage is created and sustained through a highly localized process.

Differences in national economic structures, values, cultures, institutions and histories contribute profoundly to competitive success. Globalization has, in fact, made national characteristics more important by sweeping aside impediments that insulated uncompetitive firms from competition. As transportation improves, trade barriers fall and markets become global, the underlying competitiveness of the economy comes to the fore. The national characteristics that matter, however, are not those envisioned by traditional comparative advantage theory. National characteristics that allow the rapid upgrading of skills and technology in industry become the key forces underpinning competitive advantage, rather than factor endowments.

Efforts to explain national competitiveness based largely or exclusively on macroeconomic conditions are insufficient. Companies do not sell inflation rates, exchange rates or unit labour costs; they sell products and services. Firms, and nations, have succeeded or failed in spite of macroeconomic environments that vary widely. This does not mean that macroeconomic conditions are unimportant; they do represent an important context for company behaviour, especially investment. But a preoccupation with macroeconomic factors must not obscure attention to the underlying skills, technology, and dynamism that underpin competitive success in particular industries.

Explanations of national competitiveness that focus on government policy are similarly incomplete, if not misleading. Few industries receive government attention even in nations with activist industrial policies. The historical record amply demonstrates that government industrial policies fail at least as often as they succeed, even in nations such as Japan and Korea. Moreover, nations with widely criticized economic policies, such as Italy, still produce competitive firms in many industries. Government's role, it seems, is partial and far from determining.

Although traditional comparative advantage, macroeconomic conditions and government industrial policies all contribute to explaining patterns of trade, they are far from sufficient. What is needed is a new paradigm that presents a more holistic explanation and is based on a richer and more realistic view of competition. Past explanations for competitiveness have been static and focused on cost differences between nations due to factor costs, scale and government subsidies. Actual competition is profoundly dynamic. Products and processes are constantly changing, and success is driven as much or more by better quality, unique features, superior production processes and more responsive service as it is by cost differences.

This paradigm must explain several empirical facts. First, no nation is competitive in every industry; nations are competitive only in particular industries and industry segments. Second, nations succeed not in isolated industries but in entire clusters of interconnected industries. Third, the pattern of competitive clusters differs markedly from nation to nation. To understand competitiveness, we must look more deeply at national characteristics that have not been fully explored by previous work.

1. NATIONAL DETERMINANTS OF COMPETITIVE ADVANTAGE: THE 'DIAMOND'

As noted in Chapter 1, the principal economic goal of a nation is to provide a high and rising standard of living for its citizens. This goal depends on the nation's ability to achieve high and rising levels of productivity in the activities it performs. Sustained productivity growth requires that the economy continually upgrade itself, by improving productivity in existing activities and moving into higher productivity segments of the industries in which it competes and entering entirely new industries that offer the prospects for high productivity. This is true for both goods and services.

Industries that compete internationally have particular leverage for productivity growth. The most productive industries can expand via exports, and absorb resources from less productive industries whose products can be imported. This highlights, however, why the ability to export *per se* is not what is most valuable. Exports based on low wages and low profits do not boost a nation's standard of living; only those reflecting high productivity do. The traded sector, because it faces international competition, is also of crucial importance because it will be the place where weaknesses in an economy first become apparent.

To understand the determinants of productivity and the process of upgrading that underpins it, we must focus on specific industries and industry segments. It is only at this level that the process by which specialized skills and technology are created and improved can be fully understood. The question then becomes: what is it about a nation that supports high productivity and rapid upgrading in individual industries? What is it about a nation that provides a dynamic environment for its firms?

The primary conclusion from the ten-nation study is that sustained competitive advantage results from rapid improvement and innovation, not static advantages. Here innovation is defined in the broadest sense of the word, to encompass not only technology but the full spectrum of methods of competing. In order to ensure success, innovation must anticipate international, not just domestic, needs. Moreover, the creation of competitive advantage is not a one-time occurrence. Sustaining advantage requires that its sources be relentlessly broadened and upgraded to more sophisticated types. Japanese automobile firms, for example, have not prevailed because they rested on cheap wages or large-scale factories but because they moved successively to leadership in process technology, product technology, and the skills to penetrate premium segments. Finally, moving early to address each round of industry changes yields more advantages because it allows a nation's firms to penetrate foreign markets without direct opposition.

Competitiveness is not understood by seeking the balancing mechanisms that work toward an equilibrium but in understanding the cumulative processes of change. Competitiveness is due less to optimization within fixed constraints than to success in altering the constraints, whether they be an existing technology or an available factor pool.

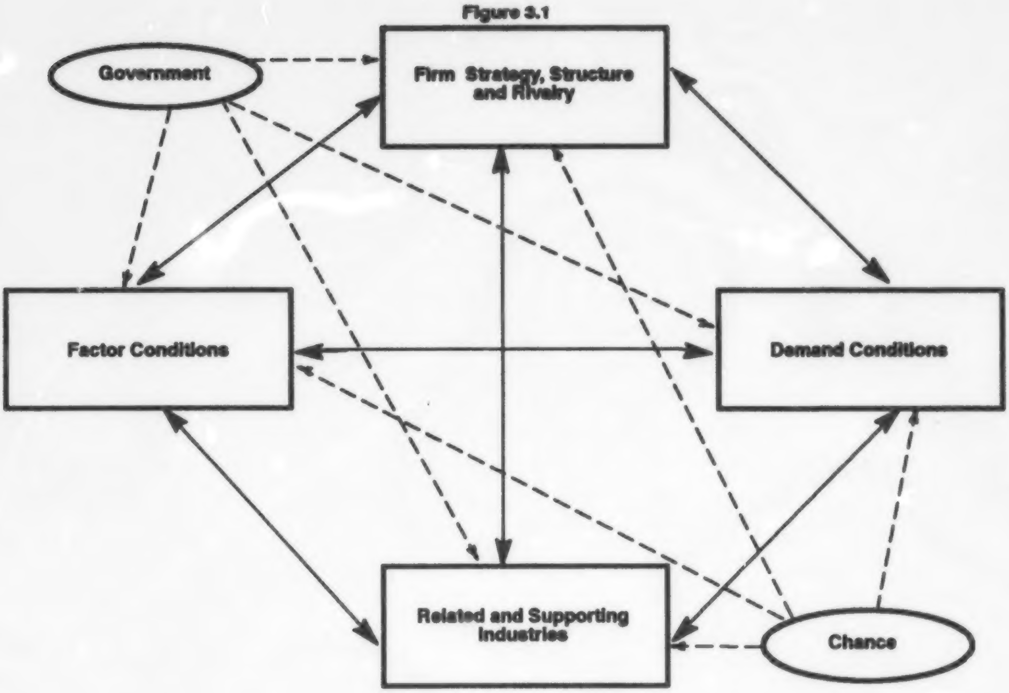
The ten-nation study found that a country is best viewed as a platform for a firm's global strategy, not the place where all a firm's activities are or should be performed. The home base is where a firm's strategy is set for a particular product line or business, where the core product or process technology are created and maintained, and where a critical mass of sophisticated production takes place. A firm may have a different home base for different businesses. Pratt and Whitney's home base for turboprop and small turbofan engines is in Canada, for example, while its large turbofan engine business is based in the United States.

Firms must compete with a global perspective, and not only sell but even locate activities around the world. Yet the home base plays a decisive role in a firm's ability to compete globally. Firms succeed when the nation provides a home base that favours innovation and upgrading in a particular business.

The location of the home base also has the greatest impact on national prosperity. It is where the most productive jobs reside, and where the most fruitful linkages with other domestic industries are established. A nation's ability to upgrade its productivity over time is critically dependent on its ability to provide a good home base for international firms, both domestic and foreign-owned.

The question that must be answered is why certain firms, based in certain countries, are capable of consistent improvement, innovation and upgrading in particular fields. What is it that causes them to single-mindedly pursue increasingly more sophisticated competitive advantages? The results of the ten-nation study suggest that the answer lies in four national attributes that shape the environment for a nation's firms to compete in a particular field (see Figure 3.1).

Figure 3.1


Government
Firm Strategy, Structure and Rivalry
Factor Conditions
Demand Conditions
Related and Supporting Industries
Chance

A. Factor Conditions

Factor conditions refer to the nation's circumstances in so-called factors of production, or the basic inputs necessary to compete in an industry, such as labour, arable land, natural resources, infrastructure and capital. Factors have an important role in international competition, but a rather different one than that envisaged by traditional theory. To understand better the role of productive factors in determining competitive success, we must first distinguish between basic factors and advanced factors. Basic factors are those that are passively inherited by a nation or created through moderate (in quantity and sophistication) investment, including natural resources, climate, and unskilled or semi-skilled labour. Basic factors, notably the availability of low-cost labour, have been responsible for the growth of manufacturing in countries such as Taiwan and Thailand. Advanced factors are those developed through sustained and sophisticated investment in both human and physical capital, such as modern digital data communications infrastructure or world-class university research institutes.

We must also distinguish between generalized and specialized factors of production. Generalized factors are those that can be employed in a wide range of industries, such as a highway system, a pool of debt capital, or a cadre of college graduates. Japan, for example, has a very large number of engineering graduates per capita. Specialized factors are those that are relevant to one or a limited range of industries, such as an optics research institute or a port specialized in handling newsprint. For instance, U.S. leadership in the software industry has greatly benefited from the availability of specialized sources of debt and equity capital. The U.S. has many venture capital firms and banks that understand the software industry and supply funds to firms that often cannot provide hard assets for collateral.

The most significant and sustainable competitive advantage results when a nation possesses factors needed to compete in a particular industry that are both advanced and specialized. The pre-eminence of German firms in optics, for example, results from the powerful combination of university programs in optics and specialized apprenticeship training programs. Generic technology is readily sourced from distant suppliers, but the transfer of know-how benefits from proximity. In contrast, advantage based on basic or generalized factors tends to be easier to replicate or obtain through foreign sourcing, making them less stable sources of competitive advantage.

The factors most important to modern industrial competition are created, not inherited. A nation's stock of factors at any particular time is less important than the rate at which they are created, upgraded, and made more specialized to particular industries. The nation's educational and research institutions are particularly valuable to this process. The presence of unique institutional mechanisms for creating specialized factors in particular industries is an important determinant of competitive success. Nations that continually invest in the creation of advanced and specialized factors often translate these investments into industrial success.

The private sector plays a vital role in the creation of advanced and specialized factors. Firms and industry associations are usually best positioned to understand where the important investments are needed and where they will achieve the maximum impact. Government efforts to create advanced and specialized factors often fail unless industry is closely involved in the process.

Specialized factors of production are also sometimes mobile among nations. Mobile factors, such as skilled personnel and technology, are attracted to the location where they can be put to the most productive use. This depends on the health of the overall diamond. Nascent New Zealand software developers, for example, have regularly moved to the U.S. because the U.S. diamond is more attractive for the software industry. Some of the same forces that govern the attraction of mobile factors also drive competitiveness more generally.

Another central finding of the ten-nation study was that selective disadvantages in basic factors can contribute to sustained competitive success, by prodding firms to overcome the disadvantages through innovation. High land costs in Japan, for example, imposed significant constraints on factory space. This led to the introduction of a variety of space-saving techniques, including just-in-time production, which dramatically reduced inventory and increased efficiency. Similarly, high transportation costs to sites in Northern Italy promoted the development of mini-mill steel technology around Brescia. Likewise, geographic distances to export markets promoted the development of innovative logistical transportation methods in countries such as

Sweden and Japan. Selective disadvantages break dependence on simple modes of competing and can trigger upgrading.

Whether selective factor disadvantages trigger upgrading or lead to harvesting, however, depends on circumstances elsewhere in the diamond. Disadvantages must be selective rather than systemic. Firms must be able to innovate in such a way that reduces the importance of the factor in which they have a disadvantage. Finally, the conditions in the other determinants must be favourable so that the selective disadvantage results in successful attempts at innovation. Selective factor disadvantages will not lead to innovation without the presence of skilled human resources and related and supporting industries to overcome them, firm goals and strategies that allow for innovation rather than disinvestment, and local demand conditions that signal proper directions of change.

A more surprising finding, with particular relevance for Canada, is that an abundance of basic inherited factors may work to undermine rather than enhance competitive advantage. If abundant resources are at hand, there is often little incentive to obtain or deploy them in the most productive manner. There is also little pressure to upgrade from a reliance solely on the factor endowments themselves to more sophisticated production processes, improved products, or higher levels of skill. This may not represent a problem if a nation's factor resources are in such abundance that their uniqueness is assured. Natural resource advantages, however, are notoriously vulnerable to depletion, new technologies that substitute or make lower quality resources competitive, new sources of cost effective resources, and competition from developing nations that often have little choice but to target resource industries. Yet if resource advantages dwindle, firms that have depended on them and have not continually improved their products and processes will be ill equipped to respond.

B. Demand Conditions

Differences rather than similarities in customer preferences among nations drive innovation and competitive success. The composition of home demand proves far more significant than its size. Home demand plays a disproportionate role in influencing the perception of buyer needs and the capacity of firms to improve products and services over time.

Nations succeed in segments that are particularly large and visible at home. Such segments, which are smaller in relative terms elsewhere, attract attention and efforts at innovation that are not expended elsewhere. Local firms understand them better, and can fill gaps in international markets. Companies that gain competitive advantage in sophisticated industries and segments often have domestic customers who are among the world's most sophisticated and demanding buyers of their products or services. Such buyers provide a window into advanced customer needs. They pressure companies to meet high standards and encourage them to improve, to innovate, and to upgrade into more advanced segments. Swedish firms, for example, are internationally successful in equipment for hard rock mining as a result of challenging geological conditions in Sweden. Japanese firms are leaders in compact equipment such as quiet, energy efficient air conditioners, reflecting close living conditions and high energy costs in Japan. Local buyers especially benefit a nation's companies if their needs anticipate or even shape those of other nations. This means they provide ongoing early indicators of global market trends, such as American consumer preferences in popular entertainment industries.

As with factor conditions, demand conditions provide advantages by forcing companies to respond to tough challenges. A demanding market, rather than a welcoming or easy to serve one, is what underpins success. The closer a company is to leading-edge buyers, the sharper are the signals seen by the firm and its management. In addition, limited or saturated domestic demand has pressured nations such as Switzerland, Sweden, Korea and Japan into export markets. In Japan, for example, rapid saturation of consumer electronic products forces rapid new product development cycles.

C. Related and Supporting Industries

Competitive advantage is also strongly influenced by the presence of home-based suppliers and related industries in those products, components, machines, or services that are specialized and/or integral to the process of innovation in the industry. Competitive, home-based suppliers of specialized inputs and machinery create advantages in downstream industries in several ways. They can provide cost-effective inputs in an efficient, early, rapid, and sometimes preferential way. Far more significant than mere access to components and machinery, however, is the advantage based on the role of proximity in fostering close working relationships, exchange of know-how, and mutual pressures to progress. Inputs themselves are mobile, but there are local externalities for the process of innovation in interactions between the firm and local input suppliers. Home-based supporting industries become integral to innovation and upgrading. Suppliers and end-users with home bases located near each other can take advantage of short lines of communication, a quick and constant flow of information, and an ongoing exchange of ideas and innovations. In many industries, the scarce technology is know-how, which can be difficult to transfer without cultural and physical proximity. Companies with home-based suppliers also have the opportunity to influence their suppliers' technical efforts, shape specifications to fit particular needs, serve as test sites for R&D work, and maintain ongoing senior management contact. All of these accelerate the pace of innovation. In Japan, for example, world-class suppliers of numerical controls have been a competitive advantage for local machine tool producers.

Related industries are those that are linked to an industry by common technologies, distribution channels, skills, or customers. Home-based competitiveness in related industries provides benefits similar to those obtained through world-class local supplier industries: rapid information flow and technical interchange increase the rate of innovation and upgrading. The presence of a home-based related industry increases the likelihood that companies will embrace new skills. It also provides a source of entrants who bring a novel approach to competing. Swiss leadership in pharmaceuticals was related to earlier success in dyes. Japanese dominance in electronic musical keyboards grew out of earlier success in acoustic instruments combined with a strong position in consumer electronics. Korean firms not only have a leading international position in video cassette recorders but also in videotape. Several German machinery industries grew out of the earlier textile machinery industry.

D. Firm Strategy, Structure and Rivalry

Nations provide a context for competition that has a strong impact on characteristic strategies, management practices and forms of organization. The goals of firms and individuals condition their willingness to invest, take risk and upgrade. These in turn are influenced by the capital markets, tax structures, social attitudes, and perceived national challenges or priorities. National challenges or priorities tend to attract high-calibre people and resources. The national challenge of self-sufficiency in raw materials has attracted resources and personnel to the German chemical industry. Given these features, some types of strategies work well in a given nation while some are difficult to carry out. Firms tend to succeed in industries where what works well in the nation also works well in the industry. Many internationally competitive Italian industries are populated by dozens or even hundreds of small firms employing focused strategies. Most Italian industries populated by large firms, on the other hand, have huge negative trade balances.

One of the most striking findings of the ten-nation study was the critical role played by domestic rivalry in achieving international success. The dynamism and pressure created by vibrant local rivalry was perhaps the single most important stimulus to innovation and upgrading in an industry. This held true for both small and large countries.

Domestic rivalry provides the essential motivation for firms to make the investments and take the risks necessary for competitive advantage. Competition with foreign firms can be an important stimulus for improvement, but it is rarely an effective substitute for domestic rivalry. Proximity speeds information flow and improves incentives to compete. The presence of domestic competitors negates basic factor advantages and forces firms to develop higher order and ultimately more sustainable advantages. At the same time, the presence of actual rivals provides a greater stimulus to innovation than potential rivalry. It provides a greater spur to improvement and spills over to improve the health of the entire diamond.

Many successful international industries are characterized by high levels of domestic rivalry. This is true in Switzerland where the pharmaceutical (three major firms), trading (a dozen major firms), banking (three large firms, several medium-sized firms), machine tool (more than 100 firms), and packaging machinery (dozens of firms) industries are all highly competitive. It is also true in Japan, where there are nine auto companies, seven carbon fibre producers, more than 200 robotics firms, 30 facsimile manufacturers, 15 camera companies, four major motorcycle firms, and so on. Similarly, many of Italy's industries are populated by dozens or even hundreds of firms that compete vigorously among themselves. This is true in ceramic tiles, footwear, machine tools, packaging machinery, textiles, and apparel.

Healthy rivalry in a nation depends on new business formation through spin-offs, diversification by established firms, or the creation of totally new firms. New business formation translates the ideas and aspirations of its entrepreneurs into economic success. New business formation is important because it is new entrants who often discover new segments, new processes and other innovations. The capacity for new business formation is influenced by such things as the availability of venture capital or bank financing, regulations that limit entry, bankruptcy laws, and social attitudes toward failure.

E. The Role of Chance

While the parts of the diamond are relatively stable, chance events can influence the possibilities for competitive success in important ways. Chance events are developments outside the control of firms (and usually the nation's government), including, among others, pure inventions, breakthroughs in basic technologies, wars, and external political developments. Chance events are important because they create discontinuities that allow shifts in competitive position. They can nullify the advantages of previously established competitors and create the potential for firms from another nation, with a diamond more suitable for new and different conditions, to supplant them.

Chance events have occurred in the history of many industries. Economies with limited strength in the diamond are particularly dependent on (and vulnerable to) chance events. In advanced economies, what appear to be accidents are often in fact driven by conditions in the diamond. Innovations reflect sophisticated demand, unique factor pools, world-class suppliers and so on. At the same time, the likelihood that chance events will translate into full-fledged innovative industries has much to do with whether underlying conditions in the diamond are favourable.

There were many cases in our research in which a company founded in one location, through an act of pure entrepreneurship, relocated its operations to another location or even to another country because that new location offered a better setting in which to nurture or reap the rewards of that innovation. The pilgrimage of aspiring actors and actresses to Hollywood is one example of how ideas and talent flow to the environment in which they can command the highest returns. The ability to do so depends on the simultaneous presence of unusual local demand, related industries, active rivals bidding for inputs and other favourable conditions in the diamond.

F. The Role of Government

Government has a less decisive role than is implied in much of the current writing on competitiveness. Government policy towards the economy is often framed as a choice between laissez-faire and direct intervention in industry. This dichotomy is inaccurate. The role of government policy is best understood by looking at how it influences the diamond. Government at all levels can improve or impede national advantage through, for example, its investments in factor creation, through its role as a buyer or influencer of buyer needs, through its role in related and supporting industries, through its influence on the goals of individuals and firms, and through its competition policies.

The proper role of government is to improve the quality of the inputs (factors) firms can draw upon, and define a competitive environment and rules of the game that promote upgrading. Government plays an important part in shaping the pressures, incentives, and capabilities of a nation's firms.

Government's role is inherently partial, and it succeeds only when working in tandem with favourable underlying conditions in the diamond. Government policies that succeed are those that create an environment in which companies can gain competitive advantage rather than those that involve government directly in the process. Its appropriate role is an indirect, rather than direct, one. Government's proper role is as a catalyst and challenger. It is to encourage, or even push, companies to raise their aspirations and move to higher levels of competitive performance, even though this process may be unpleasant and difficult. Government's job is to make firms feel wanted but uncomfortable and in need of improvement, not to forge cozy business-government "partnerships," relax pressures on industry, or seek to eliminate risks.

G. The Diamond as a System

Each of the four determinants of competitiveness -- factor conditions, demand conditions, related and supporting industries, and firm strategy, structure and rivalry -- influences the capacity of a nation's industry to innovate and upgrade. Together they constitute a dynamic system that is more important than its parts. Over time, the determinants tend to be mutually reinforcing or mutually undermining.

The ability to benefit from one attribute in the diamond depends on the state of others. The presence of sophisticated and demanding buyers, for example, will not result in advanced products or production processes unless the quality of human resources enables firms to respond to buyer needs. There must also be a climate that supports sustained investment to fund the development of these products and processes. Similarly, having selective disadvantages in basic factors (for example, higher labour, energy or raw material costs) will not spur innovation and upgrading unless corporate goals support sustained investment and there is an environment of vigorous competition among firms to trigger innovation in people, products and processes. It is this contingent relationship that explains why, for example, high wages or energy costs stimulate innovation in one country while hastening decline in another. At the broadest level, weaknesses in any one determinant will constrain an industry's potential for advancement and upgrading.

The development of specialized supporting industries tends to increase the supply of specialized factors that also benefit an industry. Vigorous domestic rivalry also stimulates the development of unique pools of specialized factors. This is particularly likely if the rivals are all located in one city or region. The University of California at Davis, for example, has become the world's leading centre of wine-making research, working closely with the California wine industry. Active local rivalry also upgrades home demand through educating buyers and providing choice, and promotes the formation and specialization of supporting industries by calling attention to the industry and providing multiple customers for any supplier's products and services. Japan's world-leading group of semiconductor producers, for example, has spawned world-leading Japanese semiconductor equipment manufacturers.

The effects can work in all directions, and causality can become blurred over time. Sometimes world-class suppliers become new entrants in the industry that they have been supplying. Or highly sophisticated buyers may enter a supplier industry, particularly when they have relevant skills and view the upstream industry as strategic. In the case of the Japanese robotics industry, for example, Matsushita and Kawasaki originally designed robots for internal use before selling them to others.

The national and local environment for competing in a particular industry itself evolves in a dynamic process. The environment is created over time through the mutual reinforcement of the determinants which reflect in part the actions of firms themselves. It begins with an inheritance drawn from other industries and history, and exists amid a set of local institutions, values and attitudes.

The diamond also bears centrally on a nation's ability to attract mobile factors of production, a final form of mutual reinforcement. Mobile factors, particularly ideas and highly skilled individuals, are becoming increasingly important to international competitiveness. Mobile factors tend to be drawn to the location where they can achieve the greatest productivity, because that is where they can obtain the highest returns. Because the theory outlined above focuses on the determinants of productivity, it also explains the attraction of mobile factors. The same features that make a nation an attractive home base also help it attract mobile factors.

Advantages in the entire diamond may not be necessary for competitive advantage in low skill or inherently resource-dependent industries. Firms may also be able to penetrate the standardized, lower technology segments of more advanced industries without broad advantages in the diamond. In such instances, basic factor costs may be decisive. Competitive advantage in more sophisticated industries and industry segments, on the other hand, rarely results from strength in a single determinant. Sustained success in these industries and segments usually requires the interaction of favourable conditions in several of the determinants and at least parity in the others.

It is thus the juxtaposition of advantages throughout the diamond in one location that leads to competitive success, far more than the presence of any single advantage -- no matter how compelling. The juxtaposition of advantages in one place unlocks their systemic character and heightens their mutual reinforcement. The firm's home base must be located in the same place to allow the intense contact and coordination with the local environment that are necessary for rapid progress. The ability of a firm to progress rapidly and appropriately by, for example, integrating research and production spread widely among several locations or combining machines sourced from many disparate distant suppliers, is limited. The firm that concentrates its core activities at a favourable home base, while competing globally, will normally progress far more rapidly. Activities located outside the home base are properly focused on sourcing low-cost basic factors, securing market access, and accessing selective technologies, skills, or information not available at home.

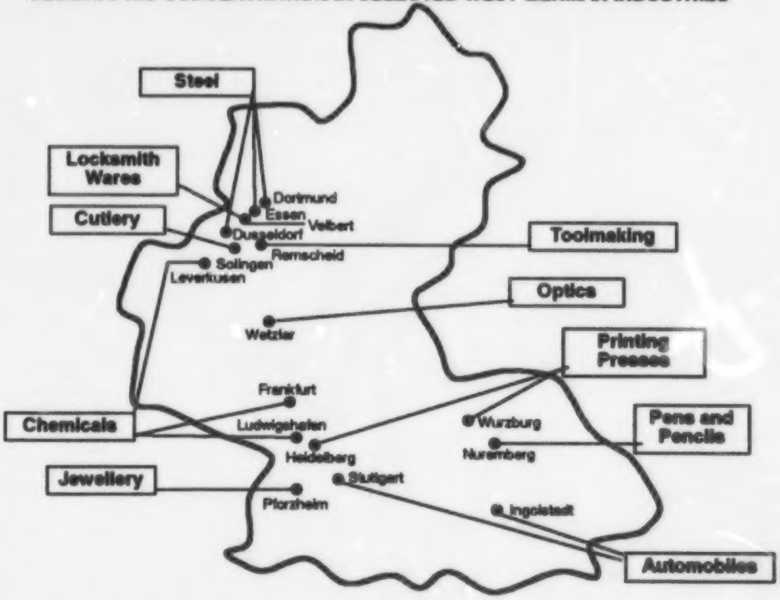
Domestic rivalry, the capacity for new business formation, and the responsiveness of a nation's institutions to signals from industry have especially great power to transform the parts of the diamond into a system. Domestic rivalry promotes improvement in all the other determinants. New business formation underpins the creation of new rivals, suppliers, buyers and related industries. Institutional responsiveness encourages the proper types of skills, resources and infrastructure to be created.

Geographic concentration also elevates and magnifies the interaction of the four determinants. It enhances the pressure from local rivalry and the frequency of spin-offs, works to stimulate and raise the sophistication of local customers, stimulates the formation of related and supporting industries, triggers greater local investment in specialized factor creation, and provides a magnet for mobile factors. Rivalry often becomes personal in geographically concentrated industries, since competitors come to know each other intimately. Competition spreads from products and processes to bragging rights, technical firsts, recruiting and supplier relationships, and all of these forms of rivalry are highly beneficial to the rate of upgrading.

Examples of competitive industries that are geographically concentrated are numerous in every country, ranging from the New York garment industry to Japanese motorcycles and Italian machine tools. In what was formerly West Germany, for example, some of the industries localized in regions and cities are shown in Figure 3.2.

Figure 3.2

GEOGRAPHIC CONCENTRATION IN SELECTED WEST GERMAN INDUSTRIES


Steel
Locksmith Wares
Cutlery
Dortmund
Essen
Velbert
Dusseldorf
Remscheid
Solingen
Leverkusen
Toolmaking
Optics
Wetzlar
Printing Presses
Frankfurt
Chemicals
Ludwigshafen
Heidelberg
Wurzburg
Pens and Pencils
Nuremberg
Jewellery
Stuttgart
Pforzheim
Ingolstadt
Automobiles

These same forces explain another important finding of the ten-nation study with particular relevance to Canada. There is often a marked disparity between the economic success of regions within nations. The striking difference between the industrial success of northern and southern Italy, northern and southern Germany, and eastern and central Canada are three such examples.

One manifestation of the systemic nature of the determinants is in the phenomenon of clustering. Clusters involve supplier industries, customer industries and related industries that are all competitive. Such clusters are characteristic of every advanced economy, including American entertainment, German chemicals, Japanese electronics and Danish foods. Nations tend to be successful in clusters of linked industries. It is rare that an isolated industry or firm achieves international success. The clustering of industries within an economy is a manifestation of the importance of sophisticated buyers and the presence of related and supporting industries. Clusters also become self-reinforcing, working to upgrade the sophistication of buyers, accelerate specialized factor creation and enhance information flow. National clusters are themselves often geographically concentrated.

Clusters grow and transform themselves through spin-offs and diversification of firms into upstream, downstream and related industries and activities. The fields where several clusters overlap are often fertile grounds for new business formation. In Japan, for example, the interrelationships among electronics and new materials are spawning new competitive strengths in fields as diverse as robotics and video screen displays.

Vital clusters of industries are often at the heart of a nation's economic development, and especially its capacity to innovate. As suggested by the trade analysis presented in Chapter 2, however, the creation of more dynamic industry clusters represents a major challenge facing the Canadian economy.

Firms lose competitive advantage either because of emerging weaknesses in their local environment or due to rigidities or other internal problems that external circumstances cannot overcome.[2] For example, a major shift in technology may require an entirely new set of specialized suppliers that are not present, or local demand characteristics may evolve in ways that distract from, instead of foreshadow, international needs. However, firms sometimes fail not because their environment is unfavourable but because of organizational or managerial rigidities that block improvement and change. The environment can provide important pressures to advance, but firms differ in their responsiveness to them.

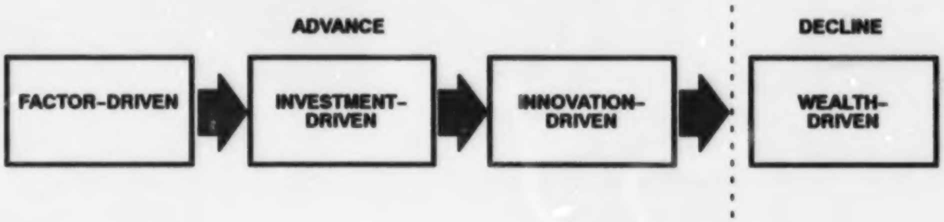
The diamond, then, including the role of chance and government, provides an explanation for why it is that firms from a particular nation will upgrade further and be more productive than firms from other nations in a particular industry. Those industries in a nation that upgrade the fastest will draw in resources and be well placed to export. Industries that upgrade slowly will experience pressures on wages and profits, and difficulty attracting qualified personnel. A prosperous economy is one where the process of upgrading is widespread and rapid, and resources are able to flow to the most productive companies and industries.

H. Stages of National Competitive Development

Nations evolve through stages of national competitive development characterized by changes in the primary sources of competitive advantage in the nation's industries. Understanding these stages will facilitate our efforts to apply the diamond in a Canadian context.

There are four stages of national competitive development: **factor-driven, investment-driven, innovation-driven, and wealth-driven**. All nations begin at the factor-driven stage. Here, virtually all the nation's internationally successful industries draw their advantage almost solely from basic factors such as natural resources or low cost labour. In the investment-driven stage, a nation and its firms actively invest in factor upgrading and in modern, efficient plants and methods, normally based on foreign technology. Advantages in the diamond widen to include more skilled labour, better infrastructure and scale facilities. This allows the nation's firms to compete in the standardized, price-sensitive segments of more sophisticated industries. Yet firms in this stage are not typically innovators or differentiators. In the innovation-driven stage, all four determinants are in place and work together to foster continuous innovation and upgrading in a wide range of industries in the economy. Here, an economy reaches the height of productivity. The fourth, or wealth-driven stage, is a stage of decline. In this stage, vitality ebbs and redistribution of wealth, rather than its creation, becomes the focus.

Figure 3.3
FOUR STAGES OF NATIONAL COMPETITIVE DEVELOPMENT



The primary distinction between the stages depends on the nature of the competitive advantages and the sophistication of the strategies and techniques employed, rather than the set of industries in which the nation competes. In other words, it is the sophistication of the methods, rather than the industries *per se*, that matters. An innovation-driven economy such as Sweden, for example, is composed of many industries that draw on natural resources. But its resource industries involve high levels of skill, technology and hence productivity. Sweden also tends to compete in the more advanced segments of these industries.

There is no inevitability about progression through these stages. Relatively few nations have moved beyond the factor-driven stage. The challenges required to establish pools of specialized factors, build sophisticated home demand, develop a range of home-based related and supporting industries, and put in place the dynamic rivalry necessary for advancing to the innovation-driven stage are daunting barriers for most nations. Active local competition is a prerequisite for advancement because it is what pressures upgrading. Those nations that have achieved substantial progress in the postwar period have all been characterized by active local competition -- for example, Japan, Korea, Taiwan and Hong Kong. The attempt to develop via monopolies, in contrast, is perhaps the most common error of developing countries.

Most countries with factor-driven economies are poor. Yet nations can be wealthy in the factor-driven stage, as in countries such as Saudi Arabia, if they possess natural resources that are abundant and unique enough relative to the size of the population. Canada is also an example of a very wealthy economy largely at the factor-driven stage of competitive development. The wealth of an economy relying on cheap labour, in contrast, is inevitably constrained by the low wages it depends on to compete.

However, even wealthy factor-driven economies are vulnerable to a loss of resource uniqueness and to technologies that nullify or eliminate their resource advantages. Such nations also compete in the industries most accessible to developing countries. Factor-driven economies also tend to be more sensitive to external shocks such as fluctuations in exchange rates and commodity prices.

At the same time, a heavy reliance on basic factors for competitive advantage creates conditions that can slow upgrading. Abundant resources and labour often lead firms to employ them inefficiently. Resource-rich nations often have little concern with skills and innovation. Attitudes and policies develop that stunt upgrading. Factor-driven economies may give rise to large, powerful resource companies that have a tendency to resist competition and press for subsidies. Government policies are prone to focus on macroeconomic management and a static cost orientation rather than on promoting dynamism and upgrading.

2. APPLYING THE DIAMOND IN A CANADIAN CONTEXT

In applying the theory to Canada, four issues of substantive importance to the Canadian economy must be addressed. In each area, the significance for Canadian competitiveness and the policy implications are often not well understood. The first issue is Canada's reliance on natural resource industries for exports. Second is the role of local rivalry in the relatively small Canadian market. Third is the extremely high degree of foreign ownership that marks much of the Canadian economy. The final issue is the importance of local, Canadian conditions in the diamond, given the country's proximity to the United States.

A. Competing Based on Natural Resources

The Canadian economy is heavily based on natural resources, as is evident from the analysis in Chapter 2. Some argue that such industries are inherently less desirable than "high-tech" or manufacturing industries. This logic is flawed.

There is nothing inherently undesirable about resource-based industries, provided that they support high levels of productivity and productivity growth. As noted earlier, resource-based industries can make a nation wealthy where its resource position is highly favourable, and Canada has benefited tremendously from its abundance of natural resources.

The concern about resource-based industries should not be about their inherent desirability, but about the extent to which they contribute directly and indirectly to productivity growth, which is primarily related to the sophistication of the skills and technology employed in them. In a global economy characterized by rapidly advancing technology, reliance solely on resource endowments in an industry carries formidable risks . One obvious risk is resource depletion. A second risk is that new sources of resources will come onto the market. Falling transport costs, new resource exploitation or processing technologies, or government subsidies may bring previously uneconomic resource supplies onto the market. This may also occur as new countries attempt to climb the development ladder, because industries depending heavily on natural resources are particularly accessible to developing countries. Competing solely on the basis of resource advantages in commodity industries makes nations particularly vulnerable to subsidies and to exogenous price and cost swings.

The third risk of depending heavily on pure resource advantages is technological advances that create substitute products which eliminate the need for resources or conserve their use. The broad trend in the world economy has been toward resource-substituting technologies. Fourth, industries supplying unprocessed resources are vulnerable to customers that control the processing technology and access to markets, who may be able to extract most of the profits. A final risk of heavy reliance on resources is that many resource industries involve specialized, sunk assets that are difficult to redeploy.

If resource-based industries can continually upgrade their sophistication through improving their processes and products, competitive positions can be sustained and productivity growth assured. However, resource-based economies often develop a set of policies, institutions, attitudes and behaviour reflecting their resource abundance that make it difficult to move beyond the factor-driven stage. By not upgrading, even wealthy, resource-based economies run the risk of an erosion in their relative standard of living.

Resource abundance has a tendency to make firms, workers and governments complacent. Firms begin to believe that they do not need to innovate in order to compete. Powerful resource companies influence government policies in ways that preserve their existing modes of behaviour. Governments come to expect that the tax revenues derived from resource rents will continue forever. Workers in the resource-based industries and in the public sector think they have a right to high wages forever. The result can be a system poorly equipped to deal with change.[3]

The New Zealand economy is an ominous case in point. More than 85 percent of New Zealand's exports depend on basic factor advantages for their competitive position. Over the past 30 years, foreign competition, substitute products, growing customer bargaining power, and resulting declines in commodity prices have cut deeply into New Zealand's relative standard of living. In 1955, New Zealand's per capita GDP was the eighth highest in the world. By 1987, it was twenty-third. Institutional structures and attitudes arising out of New Zealand's traditional resource orientation have made it very difficult for that nation to break out of its dependence on resource advantages. Weaknesses in skills, the prevalence of state-sanctioned monopolies, a social system that has all but eliminated incentives, and government policies that have reinforced resource dependence are just some of the barriers that have inhibited upgrading. The result has been near economic collapse, out of which constructive change has only recently begun.[4]

The test we must apply in appraising Canada's resource-based industries is their record of upgrading and their capacity for upgrading in the future. What is the state of their technology relative to the best foreign rivals? How has it evolved over time? And what do resource conservation practices, depletion patterns and the emergence of competitor nations imply about the sustainability of the resource advantages themselves? As we will discuss in Chapter 6, there are reasons to believe that Canada's resource industries may have difficulty in maintaining the nation's standard of living without new modes of competing.

B. The Need for Domestic Rivalry in Canada

As the framework has stressed, domestic rivalry plays an important role in innovation and in the development of competitive advantage in an economy. While openness to trade can partly substitute for the lack of competition at home, the evidence from a wide array of industries and nations confirms a strong association between active domestic rivalry and international competitive success.

Domestic rivalry, enlivened by proximity, pressures firms to innovate. The presence of local rivals nullifies factor advantages and promotes upgrading; it jars firms away from depending on the home market and pressures them to export. Import competition lacks these important benefits.

Domestic rivalry not only stimulates dynamism but, also unlike import competition, creates forces that work to improve the entire local diamond through encouraging specialized factor creation, the development of local suppliers and related industries, and so on. We did observe cases of successful industries where domestic rivalry was not present, but these reflected not only true openness to imports but unusual advantages elsewhere in the diamond and often indirect competition from local firms in other segments.

A number of observers have questioned the need for domestic rivalry in Canada. Some argue that a relatively small domestic market precludes the coexistence of Canadian rivals.[5] Others maintain that the proximity to the U.S., and U.S.-based competitors, can compensate for a lack of Canadian rivalry. Finally, examples such as Northern Telecom could be seen as refuting the theory in the Canadian case.

This line of argument, though interesting, is deficient in several respects. Domestic rivalry, as we have argued, carries unique advantages. The size of the Canadian market does not limit the size of Canadian firms and need not constrain domestic rivalry, as numerous examples drawn from small nations such as Switzerland, Denmark, Sweden, and Taiwan attest. In global competition, scale is not limited by the size of the home market, and competitive firms export a large fraction of their total production. Indeed, local rivalry plays an important role in pressuring a nation's firms to export. The number of local rivals needed for effective competition will vary by industry, depending on economies of scale. But if a nation cannot support some level of effective local rivalry, the likelihood of competitive success is slight.

Import competition from U.S. firms is certainly beneficial to Canadian dynamism, but only a partial substitute for Canadian-based rivalry (either by Canadian-owned or foreign-owned firms). Proximity of rivals is important not only to stimulate innovation but to the broader effects of rivalry on the entire diamond. Supporting evidence for this is the striking geographic concentration of successful competitors *within* nations, a prominent feature of all the nations we studied. In the U.S., for example, successful rivals are not spread evenly but are normally concentrated in one or a few states. The most beneficial U.S.-based rivals for Canadian dynamism would be those located in regions of the U.S. contiguous to Canada.

In every nation we studied, there were some firms that had achieved a measure of international success without local rivalry. Some were cases where government subsidies were present, or where government policy had limited competition in virtually all nations. Other cases reflected exceptional leadership or unusual advantages elsewhere in the diamond. In the case of Northern Telecom, for example, it is important to recognize that no nation has had true local competition. Canada, because of its multiple buyers and indirect competition, has historically had the most competitive pressure internationally in telecommunications equipment. The absence of local rivalry may be somewhat less significant when competing in pure commodity businesses based not on innovation but on factor cost. Even here, however, the beneficial effects of rivalry were strongly revealed in many countries, as the importance of innovation and the requirement to upgrade even in commodity-type industries have increased in recent years. Most evidence points to a powerful role for local rivalry in competitive advantage. The lack of local rivalry in Canada in many industries, then, will diminish the odds of sustained international success.

C. Foreign Direct Investment and Canadian Competitiveness

As noted in Chapter 2, nearly half (45.6 percent) of the manufacturing assets in Canada are controlled by foreign firms, principally from the United States. Given Canada's abundance of natural resources requiring heavy capital investments to exploit, its relatively small population, and its proximity to the U.S., this level of foreign investment is perhaps not surprising.

There has been a good deal of debate in Canada about whether foreign investment is good or bad.[6] This, we believe, is the wrong question. In most circumstances, a nation is better off with foreign investment than without it.[7] Foreign companies bring capital, skills and technology that normally boost productivity. The real issue is what foreign multinationals choose to do in Canada and how productivity in Canadian activities compares to alternative locations. The nature of their Canadian activities, in turn, influences the sustainability of foreign firms' Canadian investments and their contribution to productivity growth.

The ten-nation study identifies three types of foreign investments: those that source basic factors, those oriented toward gaining market access, and those that establish or acquire home bases. Factor-sourcing foreign investment, where the firm's home base is elsewhere, typically seeks access to natural resources, cheap labour, or other basic factors. Much of the foreign investment in Canada's resource sector appears to fall into this category. Factor-sourcing investment may allow a firm to selectively overcome or neutralize disadvantages it may face in selected factors, while competing based on advantages elsewhere in its home diamond. In some instances, foreign firms may create foreign subsidiaries to source selectively advanced and specialized factors. The investments of several German and Swiss machinery firms in U.S. electronics and software subsidiaries are representative examples. However, we did not detect factor-sourcing investments of this type in Canada.

Market access investments occur when companies must establish a presence in a country in order to gain access to its market. This is most often triggered by tariffs or non-tariff barriers. Some market access investments, however, are motivated by the desire to reap advantages from having local production, marketing, or servicing capability in close proximity to foreign customers. Market access investments are normally a manifestation of competitive advantage in the home, rather than the host, nation. In the past, much of the foreign investment in Canada's manufacturing sector was market access investment, driven by the desire to overcome Canada's historically high tariffs.

The third type of foreign investment is that which establishes or acquires regional or global home bases for product lines or business units in the host nation, even though ownership is elsewhere. Here, home base activities such as core research and sophisticated production are established in the host nation. Alternatively, the foreign firm acquires a local firm and leaves its activities intact or even extends its international mandate. Foreign investment to establish or acquire home bases is evidence that the host country possesses competitive advantage in the industry.

Assessing the contribution of foreign investment to productivity growth is based on the location of the home base activities for the product lines or businesses in which the foreign firms compete. The home base is where the essential competitive advantages of the enterprise in a particular product line or business are present.[8] The firm usually locates less productive activities elsewhere, sourcing factors or seeking market access. The concept of the home base refers to individual product lines or business units. Indeed, a diversified firm may have a different home base for each of its business units.

The country of ownership determines where the profits from the enterprise ultimately flow, and thus is significant for national income. However, the country of ownership is secondary to the location of the home base for national economic upgrading. The location of a company's owners does have a substantial influence on where its home base is located, but the two are not necessarily the same. It is possible for a product line, a business unit, or even an entire firm to have principal ownership in one nation and a home base in another.

Home bases gravitate to the location with the most favourable diamond for the product line or industry. Multinationals that locate home bases for some business segments outside their home country are becoming more common. Nestlé, for example, is in the process of moving the headquarters of some of its business units outside of Switzerland when that country does not provide the most dynamic environment, such as in candy. Similarly, the home base of CBS Records remains in the U.S., where the most innovative climate in popular music resides, despite its purchase by Sony. Autonomous regional home bases may also be located outside the home country. GM's European automotive operations have traditionally had their home base in Germany, for obvious reasons.

Compared to more limited foreign activities, the presence of home bases in a nation offers the widest set of benefits to the nation's economy compared to more limited foreign activities. The home base is the place where the firm normally contributes the most to the local economy in a particular industry. The home base represents the locus of innovation and productivity growth. It is also the location where the most beneficial externalities to other industries in the economy occur, via the diamond. The firm invests in specialized factor creation, acts as a sophisticated buyer for other local firms, acts as a sophisticated related and supporting firm for other industries, and helps to create a vibrant local competitive milieu. Spillovers of knowledge and expertise are the greatest, and the local diamond most strengthened. The result is the best climate for upgrading and productivity growth. The best situation is if the nation is the location of both the home base and ownership, because here the profits flow to the nation as well. However, the profit stream may often be less significant than the other benefits.

The ability to attract home bases presupposes a healthy local diamond. When a foreign company based in a more dynamic environment is markedly more advanced than domestic companies in an industry, the benefits to the economy provided by the foreign company may exceed those provided by a domestic company. It may be so much more sophisticated and productive that the benefits to the local economy more than offset the profits flowing out of the country. The cases where a foreign company provides greater benefits than home-based domestic firms will, however, be most likely when the foreign firm is performing home base activities in the country, rather than simply assembly or marketing.[9]

Factor sourcing and market access investments normally provide fewer benefits to the host nation than investments involving home base activities. The activities involved in factor sourcing or market access investments normally involve lower levels of productivity than home base activities and provide fewer beneficial spillovers or externalities in the economy. Factor sourcing and market access investment also tend to be less permanent; they are prone to being reversed as cheaper inputs are located elsewhere or investment in the country is no longer needed to gain market access.

The sustainability of factor sourcing and market access investments also depends on their productivity relative to other locations. In the current free trade world, if a foreign firm's Canadian operations are less productive or offer fewer prospects for upgrading than elsewhere, they will eventually be discontinued. In addition, intra-Canadian trade barriers can also have a negative effect. Such barriers can make foreign firms prone to relocate operations to a location (such as the U.S.) with equivalent access to all parts of Canada.

i) Home Base Activities of Canadian-Owned Firms

The majority of the Canadian-owned firms analyzed in our 25 industry studies had Canadian home bases. These include manufacturing firms such as CAE Electronics in flight simulators, Bombardier in urban mass transit rail vehicles, Canstar in ice skates, Hymac in pulp and paper equipment, Viceroy in pre-fabricated/manufactured housing and Northern Telecom in central office switches (although Northern Telecom has divided home base activities between the U.S. and Canada). Resource processing firms with Canadian home bases dominate in the forest products and metals and minerals sectors, and include Noranda Forest in market pulp, Abitibi in newsprint, Alcan in aluminum, and Inco and Falconbridge in nickel. Most internationally oriented Canadian service firms also have local home bases, including Scintrex in geophysical contracting, SNC/Lavalin in consulting engineering, Laidlaw in waste management services, and most of the life insurance companies.

Alcan illustrates well the home base concept. The company is widely held, with 46 percent of its common stock registered outside of Canada, and has operations worldwide. Only 13.4 percent of Alcan's sales were made in Canada in 1990. Nonetheless, Alcan's strategic centre is in Canada, and most of its core production and R&D is carried out in Canada. Despite its dispersed ownership and global sales, Alcan continues to make far more significant contributions to the Canadian economy than to that of any other nation.

The persistence of home base activities in Canada by Canadian firms depends on the health of the Canadian diamond in their industry. If another nation's diamond becomes demonstrably more favourable for the industry than the Canadian diamond, even a Canadian-owned firm may be prone to shift its home base activities outside of Canada. In our industry studies, we found that Seagram has chosen to move more and more home base activities of its whisky business to New York City -- particularly those related to sales and marketing. Similarly, Northern Telecom conducts many high productivity activities in the United States. Significant R&D is conducted in the U.S., and sophisticated U.S. manufacturing facilities supply the American market. Many senior executives have offices in both Toronto and Washington. As we will discuss in Chapter 4, there is a possibility that Northern Telecom may shift more of its home base activities to the U.S. due to favourable demand conditions and a more plentiful supply of electronics engineers there.

ii) The Activities of Foreign Firms in Canada

Foreign investments in Canada mainly involve basic factors sourcing or market access investments. For example, General Motors of Canada is Canada's largest exporter, but strategy development and most home base activities such as design and engineering are carried out in the United States. Supporting industries to the Canadian transportation cluster, such as batteries (Eveready, Duracell and Johnson Controls) and tires (Goodyear, Michelin) are also heavily foreign-owned and foreign home-based. Although the automotive assembly industry contributes greatly to the Canadian economy, the lack of home bases in Canada means that Canada reaps fewer direct and indirect advantages from the presence of these industries than would otherwise be the case. The lack of Canadian home bases also creates vulnerabilities as trade becomes more open, especially if Canadian activities are less efficient than comparable activities elsewhere.

Similarly, many of the home base activities for major oil companies such as Exxon (Imperial Oil) or the chemical concerns (Du Pont, Union Carbide) remain located in the United States. Canadian subsidiaries' operations have traditionally been largely oriented toward factor sourcing and primary production, with limited strategic control over operations or future business development. Suncor is a partial exception, with strategic decisions concerning Canadian operations being made primarily in Canada. The general pattern holds in the great majority of other sectors.

Our industry studies uncovered only a few examples of foreign-controlled firms with product or business unit home bases in Canada. These were in cases where the Canadian diamond was favourable. One of the clearest examples is Canada's leading explosives manufacturer, ICI Explosives Canada. ICI Explosives Canada, a wholly owned subsidiary of Imperial Chemical Industries of the U.K., is the global headquarters of ICI's explosives business. The Canadian operations have the world mandate for industrial explosives, detonators, and sodium azide, and substantial research and development in explosives is based in Canada. The principal reasons for locating the home base in Canada include the demanding nature of the Canadian geological conditions, the sophistication of Canadian customers, and Canadian design and safety standards for explosives that are among the most stringent in the world.

Pratt and Whitney Canada is another example. While the company is 98 percent owned by United Technologies of Hartford, Connecticut, Canada is the worldwide home base for a particular business segment. It has sole world responsibility for the turboprop and smaller turbofan engines, including design, production, and worldwide sales and marketing. Thus the highest productivity activities for this product group are carried out in Canada. In 1988, 75 percent of Pratt and Whitney Canada's production was for export. The firm adds far more to the Canadian economy than if it were only an assembly operation designed to supply the Canadian market.

iii) Issues for Canada

Foreign investment has clearly benefited the economy. Canada's high level of productivity could not have been achieved without it. Yet the pattern of foreign activities also signals circumstances that create vulnerabilities for the future. As competition becomes more global and trade and investment barriers fall, firms are becoming increasingly discerning in locating their foreign operations. The location of activities will reflect true economic advantage. Many Canadian investments have been the result of trade agreements or are remnants of a protectionist past in which foreign firms had to produce in Canada in order to sell here. Market access investments are vulnerable, unless Canadian activities are more productive than elsewhere or can be upgraded. Many other foreign investments in Canada are clearly factor sourcing. Factor sourcing investments will remain only as long as Canadian factor endowments remain attractive. This is particularly true in cases where operations in Canada are not as productive as elsewhere.

The ability to attract and retain home base activities in Canada will depend on the health of the Canadian industry diamond of a given industry. As noted above, some Canadian firms have been shifting sophisticated activities outside of Canada. Some foreign firms with home base activities in Canada are diminishing them, including Boeing Canada's de Havilland division in commuter aircraft and Hiram Walker's Canadian whisky unit. Yet there are also examples which illustrate that a healthy Canadian diamond in a product line, combined with a new approach to strategy, can cause Canadian operations to be upgraded to home bases. For example, some foreign companies in the Canadian chemicals industry -- for example, Du Pont Canada -- have established North American or world product mandates for specific business segments in Canada and have become successful exporters.

Both the nature of foreign activities in Canada and their contribution to the economy, then, depend ultimately on the health of Canadian diamonds. Favourable diamonds, with attractive skill and technology pools, cutting-edge regulations and other advanced local demand conditions, and attractive local supplier bases, will spur an upgrading of what foreign firms do in Canada and attract more home bases. Weak diamonds, without sophisticated factor pools and lacking dynamism, will gradually cause foreign firms to downgrade what takes place in Canada. Accordingly, we will devote much attention in subsequent chapters to assessing the relative productivity of Canadian activities vis-à-vis similar activities elsewhere, the sustainability of Canadian factor advantages, and the underlying health of Canadian diamonds.

D. The Importance of Canadian Diamonds Given North American and Global Competition

Canada is located in close proximity to the U.S. and shares many similarities with its southern neighbour. Why then, should we be concerned about industry diamonds in Canada at all? Why cannot Canadian firms take advantage of circumstances in the U.S. to gain competitive advantage? Or, more generally, is there not a single North American diamond in many industries:[10]

The basic reason we should be concerned about the Canadian diamond is that the Canadian standard of living depends on the particular activities that take place in Canada. The issue is where the most highly productive economic activities, and those that most benefit upgrading in other industries, will be located. These, in turn, will determine the wages that Canadian jobs command and the returns to capital invested there. Of concern is not only the nature of the activities of Canadian firms but also those of foreign firms, as discussed in the previous section.

The location of the most productive activities, especially home base activities, is determined by the health of the Canadian diamond in the industry versus other locations. Similarly, mobile factors, especially skilled people and ideas, will tend to flow to the location with the more favourable diamond because that is where the returns will be highest.

To bring these ideas into focus for Canada, we must address two issues. The first is whether Canadian and American circumstances differ in ways that will influence industrial location, or whether there is a single North American diamond in each industry. Even if there is no single North American diamond, we must also address the question of whether firms need to be based in the most favourable diamond or whether they can, through operating in the U.S., gain the advantages missing from the Canadian diamond in their industry. Another way to frame this latter issue is in terms of the geographic extent of externalities generated by the diamond. Can a firm based in Toronto innovate as rapidly if it sources machines from the U.S. and receives its demand cues from sophisticated U.S. customers as it can if all elements of the diamond are favourable in Canada?

I) The Importance of Local Canadian Circumstances

Competitive advantage is highly localized in nations and within nations. Locations differ in the environment that they provide for innovation and upgrading. Proximity to customers, suppliers, rivals, and sources of specialized factors is crucial to the innovation process.

Regions and even cities register striking differences in economic prosperity. Indeed, the standard of living within the U.S. varies sharply, and differences have grown since the 1960s. This belies any notion that Canada's standard of living is secured by proximity to the United States. States such as California, Massachusetts, New York and Virginia have per capita incomes 50 percent higher than Alabama, Idaho and West Virginia, precisely because of differences in their local diamonds and the resulting composition and sophistication of their industries. While U.S. states have much in common, their differences are sufficient to strongly influence competitive patterns. An important question for Canada is whether it will be more like California or more like Alabama as a North American location for economic activity.

While there are many similarities between Canada and the U.S. there are also significant differences in institutions, history, culture, government structures and policies, and economic circumstances. Profound differences exist in areas such as customer behaviour, specialized factor pools, regulations, taxes, wages, laws, and other factors, as will become evident in subsequent chapters. Such differences create distinct Canadian diamonds in industries. Differences in institutions, culture, and economic circumstances also inhibit the flow of information and the transmission of challenges and pressures between countries. Although the Free Trade Agreement may lessen some differences between Canada and the U.S., it will magnify the competitive impact of differences that remain. What is important for Canada is the influence on activity in Canada due to these differences.

The geographic locus of competitive advantage can cross national borders, such as the case of German-speaking Switzerland and southern Germany, where physical proximity is combined with similarities in language, culture, factor pools and institutions. In the case of Canada, the relevant arena of competitive advantage may encompass adjacent parts of the U.S. in some industries where these criteria are met. However, because there is no single North American diamond in industries, distinct Canadian circumstances cannot be ignored.

An example of how competitive fortunes have differed even on opposite sides of the border is provided by the software industries in Vancouver and Seattle. The industry in Seattle is booming. In Vancouver -- just 225 kilometres to the north -- the industry is far smaller. Moreover, successful Canadian start-ups have been quickly acquired and assimilated by U.S. firms, which draw on better developed U.S. skill bases, demand conditions, related industries and capital pools. B.C. provides a less attractive home base than Seattle for software. This limits high skill job creation and the growth of profits in Canada. Indeed, it has been recently noted that "concern is growing, particularly in Vancouver, that the U.S. side is slowly drawing away growth-oriented, non-resource based industries in crucial sectors like high tech."[11]

ii) The Ability to Tap U.S. Strengths

Canadian firms must compete today with a North American and global perspective. However, we must distinguish between the geographic scope of competition (for example, North American or global) and the geographic locus of competitive advantage, as reflected in the diamond. Competition in the automobile industry is global, but that does not mean there is a "world diamond" for automobile manufacturing. The striking competitiveness of Japanese-based firms belies this notion. Their success has been fueled by a strong local (Japanese) diamond in which rivalry has been intense, customers demanding, and related and supporting industries well developed.

Canadian firms, by sourcing from and locating activities in the U.S., can enjoy selective advantages from the U.S. diamond. Indeed, this is what the theory advises them to do (many Canadian firms have recognized shortcomings in Canada, especially in demand conditions and related industries). A common language, cultural similarities, easy mobility and free trade facilitate the process.

The question is whether such an approach supports competitiveness and upgrading in Canadian industry. Some analysts think it does, but this is hard to reconcile with the nature of competition in a wide sample of industries, and with an understanding of the practical limits of global strategies. Canadian firms can readily buy American machines or components, and sell to American buyers. What is more important, however, is not access but the process of improvement, innovation and upgrading. Basic factors and other inputs not integral to innovation can be sourced from another nation with little cost in terms of the rate of upgrading. However, the benefits of much of the diamond for competitiveness depend on proximity. While a Canadian firm can source a machine from abroad, for example, without proximity to the supplier, it cannot improve process technology as rapidly as the American or German competitor with home-based suppliers. A Canadian company can sell in the U.S., but it is unlikely to adapt as rapidly and effectively to U.S. customer needs as a U.S.-based competitor. Similarly, a foreign rival creates pressures for improvement, but does not create the same pressures or contribute as much to the overall process of upgrading as a local rival.

Canadian companies can tap into the U.S. diamond, but only selectively. Industry-specific infrastructure (which is often tied to a small geographic area), a highly skilled workforce, and certain types of supplier and customer relationships are particularly difficult to source at a distance.

Some scholars, notably those who rightly see the multinational company as a conduit for skills and knowledge between countries, raise the possibility that multinationals with foreign subsidiaries in different nations can combine within themselves the best features of all the nations' diamonds. This thinking must confront the process of innovation and the practical limits of what multinationals actually do. Successful multinationals have home bases for each distinct business.[12] These home bases are the locus of innovation. The ability to innovate rapidly depends on the co-location of favourable conditions throughout the diamond with business unit management, core R&D activities and sophisticated production.

The process of creating skills and technology benefits from the proximity of these elements. The resulting products and processes can then often be readily transferred by the multinational to its operations in other locations. But the creation of skills and technology, and the location of home base activities on which they depend, has far different implications for national prosperity than being on the receiving end of ideas and skills created elsewhere. The externalities involved in creating skills and knowledge are local externalities within the diamond. There are also externalities involved in transferring skills and knowledge across countries within multinational networks, but these are different and carry less weight in national economic upgrading. A focus on different types of externalities seems to be at the heart of the confusion.

In any case, accessing the U.S. diamond does not give Canadian firms an advantage. Tapping into the U.S. diamond at best minimizes disadvantages. It cannot provide Canadian firms with unique advantages relative to their American competitors. Advantage accrues to a nation's firms when there are unique features of the local environment that prove useful in international competition. Features that can be readily sourced or replicated may convey parity, but not advantage.

There is also a broader question raised by the reliance of Canadian firms on conditions in the United States. The competitive position of U.S. firms has deteriorated in a range of industries. Dependence on the U.S. even for supplier access or demand may not be the wisest course in many industries.

iii) Issues for Canada

Canadian policymakers must be vitally concerned with the state of the Canadian diamonds, and even diamonds in individual Canadian regions, compared to those elsewhere. This will determine what activities take place in Canada. If the Canadian diamond is less attractive than the American diamond (or other diamonds) in an industry, Canadian firms will either move more sophisticated activities to the U.S. or face mounting competitive disadvantages with respect to American rivals. Foreign firms will downgrade their activities in Canada. Canadian policymakers must not be distracted by proximity to the U.S. from the task of strengthening the Canadian context for innovation and upgrading.

Canadian firms must also be concerned with the health of their local diamond. They should be encouraged to compete globally, but must recognize that this does not diminish the importance of their home circumstances. Their reliance on foreign skills, technology and inputs must be selective if they are to keep up in the innovation race. While moving their home base may be an option for some, the ability to do so successfully is not assured even when owners and employees acquiesce. Becoming truly a part of another nation's diamond is a daunting challenge requiring time, sustained investment in assets and relationships.

Applying the Theory

The next two chapters explore the application of the above theory to Canadian industries. Chapter 4 explores four specific industries in greater detail. While each of the four industries is quite distinct, the framework described above is an effective way to explain the patterns observed. Chapter 5 provides a broad overview of the findings of our 25 industry studies as a prelude to the more detailed discussion of the determinants of Canada's competitive advantage in Part III.

PART II

INDUSTRY STUDIES

CHAPTER 4

STUDIES IN CANADIAN COMPETITIVE ADVANTAGE

Having examined the overall pattern of trade in the Canadian economy, and armed with an understanding of why nations succeed or fail in particular industries, we turn now to a close look at Canadian competitiveness at the front lines. In this chapter, we examine four representative Canadian industries in order to see the process of competition at work. These cases will illustrate and hopefully illuminate the workings of the diamond. A solid grounding in the workings of competition will be an important reference point for subsequent chapters. These cases also will illustrate and highlight issues and problems that are widespread in the Canadian economy. Through them we see firms and governments following approaches and responding to common institutional circumstances. The four cases will set the stage for a summary of all 25 cases, as well as a detailed discussion of Canada's competitive context.

The four industries profiled, drawn from the 25 Canadian industries studied in detail in the course of our research, are newsprint, central office switches, whisky and geophysical contracting. All four industries have been internationally competitive based on the criteria of above average Canadian world export share and/or high levels of Canadian direct investment abroad -- the criteria used in the original ten-nation study. They are representative of the range of competitive industries in the economy. Two are prospering, while two are threatened by eroding diamonds and mounting competitive threats. All illustrate relevant issues for Canadian competitiveness.

Newsprint is a prime example of a natural resource-dependent industry in which Canadian firms have been successful because of a low cost position arising from advantages in basic factors of production. Other elements of the diamond have not contributed significantly to Canada's competitive position in newsprint. Given that Canada is the world's leading newsprint exporter, the paucity of world-class related and supporting industries, especially in machinery and process equipment, is particularly noteworthy. The rate of upgrading and technological innovation in the Canadian newsprint industry has been slower than in most of Canada's major competitors. Furthermore, government policies in Canada have sometimes served to retard, rather than stimulate, the upgrading process. Canada's competitive position is now being undermined even further by the availability in other countries of new, low cost sources of fibre and by the trend toward recycling.

Canada's central office switch industry, which is essentially the story of Northern Telecom, is in many ways the polar opposite of newsprint. It illustrates Canada's ability to develop competitive advantage in innovation-driven industries. While far from representative of the overall pattern of Canadian competitiveness, the central office switch industry forcefully demonstrates the value of advanced factor creation mechanisms, sophisticated domestic demand, a focused firm-level strategy based on differentiation, and the mutual reinforcement of all the determinants. The industry also provides an example of positive government influence, as well as of the impact of chance events -- in this case a series of U.S. antitrust rulings and consent decrees. Despite its success, however, the central office switch industry also illustrates the potential fragility of Canadian competitive advantage outside the resource sector. The industry underscores the mobility of important business activities between Canada and the U.S., and raises the possibility that Northern Telecom may be forced to shift more of its home base activities to the United States.

Whisky is a consumer products industry that developed a substantial international position largely because of a chance event -- U.S. Prohibition. Yet, while historically successful, the Canadian-based industry is currently losing competitive position because of a deteriorating diamond. As the sources of competitive advantage have shifted from basic factor inputs such as grain, to distribution capabilities and mass marketing skills, many Canadian firms have not responded forcefully enough. Their response has been constrained by government regulations and by the failure to foster strength in the related and supporting industries needed to sustain their competitive position. In addition, Canada's high tax environment has further contributed to the decision by Seagram -- Canada's largest distilled spirits company -- to relocate more and more of its important activities, including its home base, to the United States. Many of the other firms in the Canadian industry are foreign-owned and perform most of their sophisticated activities outside of Canada.

Geophysical contracting is one of the few Canadian industries we studied in which all elements of the diamond, reinforced by appropriate government policies, have contributed to the industry's conspicuous success. Canada's large mining industry, forced to contend with challenging geological conditions, has created sophisticated and exacting Canadian demand for geophysical contracting firms. Government, universities and firms have invested heavily in the creation of advanced and specialized factors. Canadian geophysical contracting firms are geographically clustered and can draw upon a number of well-developed related and supporting industries. In addition, active and spirited rivalry prevails among Canadian firms, many of which are located in close proximity to one another. Like the whisky industry, this industry reveals the pivotal role that immigrants to Canada played in building some of the country's most successful industries.

Newsprint and whisky face particularly daunting threats to their Canadian-based competitive position, although Canada undoubtedly will remain a significant exporter in both industries. Central office switches and geophysical contracting appear well placed to sustain their competitive positions from a Canadian home base, although it seems likely that Northern Telecom will remain under pressure to shift activities to the United States. Both these latter two industries have taken advantage of favourable conditions in all the determinants. They were, however, exceptions among our 25 industry studies. The newsprint and whisky industries illustrate the more typical pattern. In these and many other industries, Canadian firms, insulated by basic factor cost advantages or other circumstances, have failed to upgrade to more sophisticated and sustainable sources of advantage or to build strong industry clusters.

1. THE CANADIAN NEWSPRINT INDUSTRY

Newsprint, a vital part of Canada's pulp and paper sector, is one of the country's most important industries. Together with market pulp, newsprint accounts for about 90 percent of Canadian pulp and paper sector exports. In 1989, newsprint represented 39 percent of Canadian pulp and paper shipments and 43 percent of sector exports. In that same year, 21 companies in Canada produced over nine million tonnes of newsprint, generating $5.5 billion in sales. This was equivalent to about one percent of Canada's GDP. Newsprint forms part of the larger Canadian forest products sector, which accounts for 4.9 percent of GDP and supports over 350 Canadian communities.

Canada enjoys an exceptionally strong international position in newsprint, with 30 percent of world production and 59 percent of world exports in 1989. Close to 90 percent of Canadian newsprint production is exported. In 1990, 80 percent of these exports were shipped to the U.S., representing more than 95 percent of U.S. newsprint imports. Other major though far less significant markets for Canadian newsprint include the EC, Latin America and Asia.

The historical success of Canada's newsprint industry is mainly attributable to the country's factor abundance and advantageous location. Canadian forests, covering a land mass equal to 150 percent of the area of the European Community, have provided a bountiful supply of extremely high-quality fibre to Canadian pulp and paper makers at relatively low costs. Canada has also benefited greatly from its proximity to the United States, the biggest single market for newsprint in the world.

These unparalleled natural advantages, however, have carried with them some disadvantages. The main source of Canada's current and past success lies in its access to an almost inexhaustible supply of relatively low-cost, high-quality fibre. Yet, the abundance of timber resources has diminished the pressure on Canadian firms to innovate, systematically upgrade processing technology, and move into more sophisticated products. The pulp and paper sector generally, and newsprint producers in particular, have historically exhibited a "commodity bias," in part attributable to the availability of low-cost wood and power. No other force, such as government policies or chance events, has actively encouraged or forced innovation and upgrading within the industry. Canadian environmental legislation, for example, has historically failed to match the leading-edge standards adopted by a number of other advanced nations.

The recent development of thermomechanical pulping (TMP), an alternative technology that permits the exploitation of low-cost fibre supplies in the U.S. South and several Latin American nations, has begun to erode Canada's traditional advantages. The result is an industry whose basic factor advantages are slipping away but that has yet to develop other advantages to compensate. Newsprint is included in this chapter not only because of its economic importance to Canada, but also because the challenges it faces are typical of those confronting other resource-based industries. One of the key challenges facing newsprint will be to convert small pockets of successful investment (the industry has some of the most, as well as some of the least, sophisticated machines internationally) into a systematic upgrading of the industry as a whole.

A. Products and Processes

Newsprint is a strong, opaque paper capable of absorbing ink quickly and of being used on very fast printing presses. The most common form is standard 30-lb. white newsprint, which is used in daily newspapers. There are, however, numerous different types of newsprint that vary by strength, opacity and brightness. Many advertisers and printers of newspaper inserts and flyers are increasingly demanding higher quality grades of newsprint in order to achieve the colour and finish they require.

The process of producing paper has not changed significantly since it was first invented in the second century A.D. Wood is composed primarily of cellulose fibres and lignin. Lignin binds the fibres and gives wood its strength and flexibility. To make paper, tree chips are broken down to their constituent fibres, either mechanically or chemically. Mechanical pulping either shreds logs on a grindstone, yielding stone groundwood pulp, or reduces wood chips to fibres between a pair of rotating discs in a refiner, yielding refiner mechanical or thermomechanical pulp. Mechanical pulping results in a higher yield per unit of wood consumed since almost all of the wood goes into paper. It also produces less pollution than chemical pulping. However, the process requires substantial amounts of energy, and the resulting paper lacks strength since the fibres are shortened in the grinding process.

Chemical pulping frees wood fibres from the lignin through a chemical process that takes place in a pressure cooker. There are two main types of chemical pulp: sulphate (kraft) and sulphite. Chemical pulping produces very strong, high-quality paper because the fibres are not seriously damaged in the pulping process. However, the required chemicals can be expensive if not recycled effectively in the process, and the process is potentially harmful to the environment. Chemical pulping also has a lower yield than other processes (only 40 percent of the wood is used in the paper).

Historically, either sulphite or semi-bleached kraft was mixed with stone groundwood mechanical pulp in the production of newsprint. Since mechanical pulp was not strong enough alone to produce sufficiently high quality newsprint, stronger chemical pulp had to be added. In the mid-1970s, however, TMP was first developed by Sunds Defibrator, a Swedish equipment manufacturer owned by SCA, a Swedish pulp and paper firm. TMP produces stronger pulp than other mechanical pulping methods, and can therefore be used as the sole furnish material in newsprint production. TMP pulping also causes significantly less pollution than traditional newsprint production methods (blending chemical with mechanical).

Newsprint is made by mixing pulp (from whatever source) with water, placing an even layer of the mixture on a screen, and then removing the water through gravity, vacuum action, pressure and heat. As the water is removed, the cellulose fibres bond to form a continuous web of paper. In modern papermaking, machines can run at speeds of up to 40-45 mph. It is a matter of seconds between the pulp reaching the screen at one end of the machine and the paper being rolled off at the other end. Computer controls monitor and control the entire process.

B. Early Industry History

The modern pulp and paper industry began in 1799, when Nicholas Louis Robert patented the first papermaking machine in France. In 1807, Henry and Selay Fourdrinier and John Gamble patented the Fourdrinier paper machine in London, England. Still in use today, this design dominated the industry until the 1970s, when twin-wire machines (discussed under Supporting Industries below) gained popularity.

Canada entered the pulp and paper industry based on superb factor endowments: an abundance of low-cost wood, cheap power, and a good transportation infrastructure. The early industry was centred almost exclusively in Ontario and Quebec. Canada's first paper mill, at St. Andrews in Argenteuil County, Quebec, began producing writing, printing and wrapping paper in 1805. Between 1817 and 1823, the first of many paper mills was built in Portneuf, Quebec, by Artemus Jackson, one of the original partners of the Argenteuil mills. These first mills did not in fact use Fourdrinier machines, relying instead on older technology machines. In 1819, Anthony Holland built the first Maritime paper mill near Halifax to supply his own newspaper with newsprint. In 1827 James Crooks constructed Ontario's first mill near Dundas; a few months later, a Don Valley mill run by John Eastwood and Eric Skinner began production. In 1843, 36 years after its invention, the first Fourdrinier paper machine was installed in Canada at Portneuf, in the MacDonald & Logan mill.

The next wave of technological innovation in the paper industry focused on improved pulping techniques. Major inventions included a commercially viable groundwood pulp process (developed by the German Freidrich Keller in 1843), a soda process for chemical pulping (invented by Englishmen Hugh Burgess and Charles Watt in 1851), a sulphite pulping process (invented in the U.S. by Benjamin and Richard Tilghman in 1865; first applied by Sweden's Carl Ekman in 1872), and a sulphate pulping process (invented by Germany's C. F. Dahl in 1884; first applied by Swede Alvar Muntszig in 1885).

Unlike the Swedes, Canadian firms tended to be conservative in the adoption of these innovations. The first commercial production of groundwood pulp in Canada did not take place until 26 years after the process had been invented. In the case of the soda process, the technological lag was 13 years. Canada's first sulphite pulp mill was built 20 years after the process was invented and 13 years after its first commercial application. The nation's first sulphate mill was built 23 years after the process was developed and 22 years after the first successful application.

As the Canadian pulp and paper industry entered the twentieth century, it was a small industry predominantly serving the Canadian market and exclusively reliant on foreign technology. Most Canadian forest products were low-value commodities, such as sawn wood and pulpwood. Concerned about the export of low-value pulpwood to the U.S. (which was made into pulp and paper south of the border), the Canadian provinces took steps to encourage the establishment of a pulp and paper industry in their jurisdictions. In 1891, British Columbia became the first province to prohibit exports of pulpwood from Crown lands. Ontario followed suit in 1902, and Quebec in 1910. These provincial government actions provided an impetus for Canadian producers to enter into pulp and paper production.

Growing U.S. demand provided a powerful stimulus for expansion of the Canadian industry. In the early 1900s, U.S. producers were not able to meet burgeoning domestic demand for newsprint. In 1913, under pressure from newspaper publishers, the U.S. government removed the tariff on newsprint imported from Canada, thereby enabling Canadian producers to supply more cost-effectively the expanding market. With access to the large and growing U.S. market and the natural resources to supply it, the Canadian industry grew rapidly. In 1918, Canada emerged as the world's largest exporter of pulp and paper, a position it has retained ever since. In 1926, Canada's newsprint production exceeded U.S. production for the first time.

Currently, the newsprint industry is highly concentrated, with seven companies controlling approximately 65 percent of Canadian capacity: Canadian Pacific Forest Products, Abitibi-Price, Fletcher Challenge Canada, Stone Consolidated, Quebec and Ontario Paper Company, Kruger, and MacMillan Bloedel. These companies are generally large integrated pulp and paper companies. Fletcher Challenge and MacMillan Bloedel dominate Western Canada and tend to employ newer, larger machines than their Eastern counterparts. Canfor and Abitibi Price dominate the much larger Eastern Industry which represents approximately 79 percent of industry capacity.

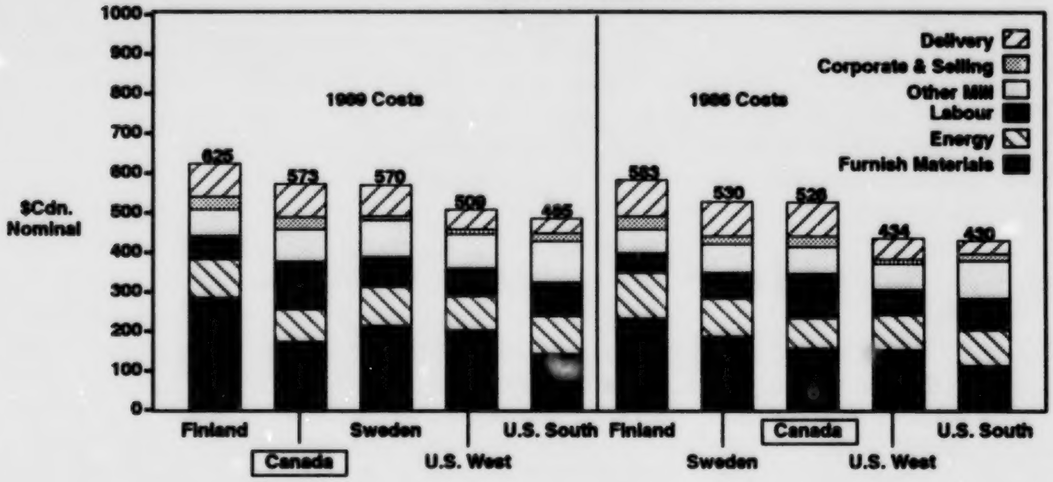
C. Canada's Advantage in Basic Factors

For almost a century, the source of Canada's competitive success in newsprint has been its basic factor advantages. Proximity to the huge U.S. market placed the Canadian industry in an excellent position to supply it. In addition, Canada's Atlantic and Pacific ports gave it a vital transportation link to both the American and European markets. The crucial factor advantage, however, has been Canada's enormous forests, which occupy some 450 million hectares. These forests are 80 percent owned by the provinces, which lease them to companies and charge royalties based on an estimate of the number or area of trees harvested. Known as stumpage fees, these royalties have traditionally been relatively low (although they have increased recently, particularly in B.C.), contributing to Canadian firms' low wood costs relative to most other producing nations. This advantage has been magnified by the fact that Canada's wood fibre is of an exceptionally high quality in terms of strength, length and brightness.

A further factor advantage for Canadian firms is the country's low energy costs and ample energy supplies. Canada has the lowest cost energy of all major newsprint producing nations thanks to its abundant supply of water resources and relatively low cost, publicly-owned electric utilities. In 1987, electricity cost U.S. producers on average about 6.0 cents/kwh, Finnish producers 4.8 cents/kwh, Swedish producers 4.2

cents/kwh, and Canadians around 3.0 cents/kwh.[1] Overall, the cost of furnish materials (wood fibre, purchased pulp and finish chemicals) and energy in Canada is currently the second lowest in the world. Only Southern U.S. producers have lower costs. Canada's abundance of relatively inexpensive basic resources has allowed its newsprint producers to maintain a competitive cost position without having to invest aggressively to reduce other costs of production (see Figure 4.1).

Figure 4.1
BREAKDOWN OF COSTS PER FINISHED TONNE OF NEWSPRINT BY GEOGRAPHIC REGION, 1986, 1989
(1989 EXCHANGE RATES)



SOURCE: PRICE WATERHOUSE

Canadian producers have a competitive disadvantage in labour costs. On average, Canadian pulp and paper workers earn wages comparable to their counterparts in other industrial countries. However, low labour productivity means that Canadian labour costs per tonne can be up to 100 percent higher than comparable American and Scandinavian costs. This poor productivity record is partially explained by Canada's numerous small mills which have relatively outdated, inefficient technology. In 1989, operating labour hours per finished tonne averaged 3.8 in Canada, versus 2.6 in the U.S. South, 2.1 in Finland and Sweden, and 1.8 in the U.S. West, "reflecting the high use of labour-intensive stone groundwood mills and small newsprint machines."[2] Reliance on traditional workplace practices, insufficient employee training, and sometimes strained labour-management relations have also contributed to Canada's poor labour productivity record. Advancement within the unions in the industry is commonly based on seniority, not training or skills. Restrictions on cross-tasking further hamper productivity. While Canadian productivity (hours worked per finished tonne) improved about ten percent from 1985 to 1989, it is still less than half the productivity level seen in the U.S. West, and two-thirds the level of the U.S. South. Currently, high labour costs represent the largest single cost disadvantage for Canadian producers and reflect the slow pace of overall upgrading throughout the industry.

D. Little Pressure to Innovate

Canada's abundant forest resources have historically allowed its newsprint firms the luxury of remaining internationally competitive without having to innovate. This, coupled with selective disadvantages, leaves the Canadian industry vulnerable in a fast changing international competitive environment.

Domestic buyers are relatively concentrated -- the largest five Canadian chains represent 75 percent of Canadian circulation, and 90 percent of Canadian newspaper revenues. However, the majority of buyers for Canadian newsprint are U.S. newspapers; approximately 70 percent of 1989 shipments were exported to the United States. As newsprint generally represents approximately 20 percent of newspapers' operating costs, newsprint buyers are extremely price sensitive. Security of supply is also a key consideration due to the high cost of machine downtime.

Recently, international buyers have become more sophisticated. The market is demanding recycled newsprint, and in some municipalities, recycled content is becoming mandatory. Furthermore, newspapers such as *U.S.A. Today* and *U.K. Today* are paying premiums for higher quality newsprint to carry the colour and quality they require. Canadian newspapers are also facing these pressures in the marketplace. Historically, however, as buyers they have not been uniquely demanding of the Canadian producers and have not provided a significant impetus for innovation.

Rivalry in Canada's newsprint industry has focused mostly on price and delivery. Although Canada has a large number of competitors (in 1988 there were over 90 newsprint machines in Canada, compared to 30 in the U.S., eight in Sweden and five in Finland), they tend to compete less on the basis of technology and innovation. In fact, there is a tradition of firms cooperating with each other on technical matters. While this technical cooperation is at the pre-competitive stage, the mindset seems to affect the industry's general approach to technology and innovation. Not perceiving technology to be a critical source of advantage, Canadian firms have never been very secretive about process developments. In Scandinavia, by contrast, large conglomerates, owning not only newsprint producers but also pulp and paper equipment makers, see technology as a key source of advantage. The Canadian attitude has contributed to a slower rate of domestic innovation than in other nations, where individual firms often compete with one another for cost advantages based on productivity and technology.

I) Comfortable Regulatory Environment

Slow domestic innovation in the Canadian newsprint industry can also be linked to the historical weakness of regulatory pressures facing Canadian pulp and paper companies compared to some of their foreign counterparts. This issue faces all segments of the pulp and paper industry, not just newsprint. For example, Canadian pulp and paper manufacturers have, on average, faced less stringent pollution standards than firms in several competing nations. Because jurisdiction over environmental matters is shared between the federal and provincial governments, and because of the importance of the industry to many regions within Canada, the development of regulatory standards has been somewhat uneven and has lagged the pace set in other jurisdictions. Historically, Canadian regulators also appear to have placed significant reliance on mandated control technologies rather than on performance standards that might have aided technological innovation. Recently proposed federal regulations (contained in the Green Plan) will be performance-based. The case-by-case control order approach used by some of the provinces, where mills are assessed individually on the basis of local circumstances, means that some mills meet fairly rigorous standards, while others do not. Lack of consistent regulatory pressure has allowed some Canadian firms to avoid aggressively upgrading their technology which would also generate productivity increases.

Water pollution from pulp and paper mills consists of two broad categories of discharges: biodegradable organic waste, which has a relatively limited environmental impact; and toxic chemical substances that are a product of the manufacturing process, and which often persist once released into the environment.

Biodegradable organic waste lowers the amount of dissolved oxygen in water, and thus lessens the water's capacity to support aquatic life. This effect is normally expressed in terms of biochemical oxygen demand (BOD). BOD measures the potential damage of discharges; the actual impact upon the receiving water's dissolved oxygen will depend not just on the amount of waste released but also on the size of the body of water, its dilution capability, water temperature, and the extent of other discharges.

Pulp mills that use the chlorine bleaching process discharge organochlorines as well as other organic pollutants. However, in 1988, it was discovered that bleached kraft pulp mills also discharge small quantities of dioxins, a particular group of organochlorines that are persistent and highly toxic to the environment. This has brought bleached-kraft pulp mills under intense scrutiny in many parts of the world. In Canada, dioxins are not, as yet, regulated substances; new federal regulations are expected to be announced shortly that will regulate dioxin discharges and require them to be "non-measurable."[3] Though emissions of dioxins have been reduced in Canada, other countries appear to be ready to move aggressively to control dioxin discharges. In Germany, for example, there has been a move to ban bleached kraft pulping altogether.

Initial regulations to deal with pulp and paper mill effluent were developed under the federal Fisheries Act in 1971, and covered both BOD and total suspended solids (TSS). Considerable progress has been made in reducing BOD and TSS discharges from pulp and paper mills. However, achievements have been uneven, and have not kept pace with improvements in other nations, resulting in less pressure for change in Canada. One study has shown that in 1987, the average BOD discharge per tonne of pulp was 3.7 kg in the United States and 11.5 kg in Sweden, compared to 17 kg in Ontario.[4] Less pressure for change blunts incentives to adopt or adapt the latest process technology in pulp and paper production.

The federal Fisheries Act regulations apply only to mills built or expanded since November 1971, and thus have had relatively limited application. Of more significance, however, are the standards adopted in various provinces. Many provinces have enacted similar, although not identical, regulations to those of the federal government, while others operate on a case-by-case basis and have imposed more stringent requirements in certain instances. In Ontario, for example, regulation of the industry is mainly through a series of "control orders" -- specifying effluent limits and compliance schedules -- that are negotiated with individual mills. These orders tend to be based upon the "best available technology" and, increasingly, upon similar requirements being legislated in other jurisdictions. Studies have shown that the newer mills in Ontario have had the best performance (in some cases, among the best in the world), while older mills have often failed to meet targeted reductions.

More pressure to innovate with pollution and process technologies is expected through new federal regulations applicable to all mills, scheduled to come fully into force in 1994. New, tougher regulations are also being developed in Ontario, Quebec, British Columbia and Alberta.[5] Possible new federal regulations would limit the release of dioxins to a non-detectable level. Proposed federal and provincial standards with respect to organochlorines will raise Canadian standards to a level close to the strictest in the world. Currently, the pulp and paper industry estimates that it will have to invest up to $5 billion to meet these new standards. At the same time, there is growing evidence of a firmer policy on the part of governments toward new mills.

Notwithstanding this progress, the past regulatory mindset has not helped the long-run competitive cost position of the industry. In addition, the fact remains that the Canadian pulp and paper industry is increasingly viewed abroad as having a poor environmental record. Some environmental groups in Europe are even pressing for a boycott of Canadian pulp and paper. Criticism focuses on several aspects: harvesting and reforestation practices, where Canada's trailing efforts in reforestation have raised long-run costs in the industry due to the long growth time of Canadian trees; the use of chlorine bleaching processes in mills, which has caused concern in certain European nations; and the perceived laxity in the regulation of mill effluents. Pressure on the industry to constantly improve its environmental record can be expected to remain intense, even with the proposed changes in regulations. Enforcement of new standards in Canada will be carefully monitored by the world community.

ii) Little Advanced Factor Creation

Innovative and productive manufacturing industries have a capacity to perform commercially relevant R&D and have mechanisms in place to develop advanced and specialized skills. Canada has a handful of research institutes in the forest sector, notably Paprican, Feric and Forintek (the latter focuses on wood products, not just pulp and paper). These organizations have made important contributions. However, their effort is split between basic and applied research and much of their applied research effort is absorbed in adapting existing technologies to Canadian processes. Overall, Canada's research effort in the forest sector -- 0.3 percent of sales in pulp and paper -- is surprisingly modest considering the enormous economic contribution that the sector makes to the country's economic well-being.

Because Canadian pulp and paper sector exports have been weighted toward commodity-type products that compete on the basis of price, much of the research conducted by individual firms in the Canadian industry has been aimed at improving relative position in commodity-type products, rather than developing innovative products to enter related higher sophistication industries such as fine papers.

In the area of education and training for pulp and paper, efforts in Canada are not particularly well developed relative to other nations and have not been a national priority. Historically, the industry's commitment to training has been weak, although it has improved in recent years. Unions have often resisted multi-skilling and other work innovations that could enhance productivity. At the institutional level, Canada has no undergraduate post-secondary programs devoted to the pulp and paper industry. Only two technical schools (in Trois Rivières, Quebec, and Burnaby, British Columbia) and two master's programs (McGill and U.B.C.) are focused on pulp and paper. In contrast, Scandinavian schools offer significantly better technical programs and attract highly qualified students.

E. Weakness of Supporting Industries: The Case of Pulp and Paper Equipment

Canada has not developed or sustained strong related and supporting industries to newsprint. The clearest example is the pulp and paper equipment supply industry. In 1987, approximately 50 pulp and paper equipment manufacturers, employing some 4,000 people, were operating in Canada. These companies supply roughly 50 percent of the domestic market of $400 million per year. Only 10 percent of the market is supplied by Canadian-controlled firms. By way of contrast, four Scandinavian equipment producers (Tampella, Repola, Ahlstrom and Kvaerner) supply virtually all Scandinavian market needs. While Canada has some strengths in this industry, its once strong position has declined and other countries have increasingly overtaken Canadian firms in new product and technological developments as well as in industrial research. As one industry expert explained, "the cutting edge of technology in our industry has passed to Sweden and Finland. I attribute this primarily to the research organizations in these countries combined with their educational systems."[6]

World War I presented Canada with an opportunity to establish a supporting pulp and paper equipment industry because it prevented European manufacturers from providing both service and parts to Canadian pulp and paper companies. Dominion Bridge Company, a Canadian firm, filled this gap by establishing Dominion Engineering Works (DEW), to produce pulp and paper machinery. In its first decade, DEW built 43 paper machines and displaced the Europeans as the major supplier to the Canadian market.

In 1962, DEW was acquired by CGE, the Canadian subsidiary of U.S.-based General Electric. In the late 1960s, DEW, in conjunction with Paprican, developed the twin wire former, known as the Papriformer -- a rare example of Canada at the forefront of technological development in the forest sector. The Papriformer paper machine was faster, more energy efficient, and smaller than the Fourdrinier. It allowed for rapid, controlled drainage that contributed to better sheet formation, increased uniformity and improved physical properties. One of the first fundamental changes in paper making technology since the development of the Fourdrinier machine in 1807, the Papriformer put Canada on the leading edge of papermaking technology. The first Papriformer was installed in Bromptville, Quebec, for Kruger. During the early 1970s, DEW won several U.S. contracts for Papriformers and opened licensees in Italy and Japan. It had established itself as a successful player in pulp and paper machinery worldwide.

In the 1970s, however, DEW collapsed. Demand for paper grew more slowly, oil prices and interest rates soared, and the cost of compliance with environmental regulations was rising -- resulting in rapidly escalating costs for papermakers. At the same time, CGE was pressuring DEW for improved short-term profitability. In response to these pressures and the economic downturn, DEW laid off over 50 percent of its sales force, design staff and product engineers.

Meanwhile, technological changes such as de-inking, recycling and TMP required customization of machines, and high levels of technical support. Having introduced a radically new technology into the conservative Canadian market, DEW failed to provide sufficient product support, customization and sales effort to satisfy the needs of its customers. As a result, it did not sell a single Papriformer from 1975 to 1979. As DEW faltered in the late 1970s, American, German, Swedish and Finnish competitors reestablished themselves as the major suppliers to the Canadian market.

DEW's brief success was an anomaly in the Canadian pulp and paper equipment industry. Most Canadian equipment manufacturers were, and still are, small regional companies. They focus on supplying low-value equipment and parts, not state-of-the-art systems. They primarily serve the domestic market and have not developed the expertise needed to compete effectively in foreign markets. The value of imported pulp and paper equipment into Canada in 1987 was almost twice Canadian exports of $107 million. At the same time, over 80 percent of the pulp and paper equipment currently produced in Canada is made by subsidiaries of foreign firms. Canada increasingly is becoming known as a manufacturer of components, such as radial drilling or roll grinding equipment, for foreign parent companies.

The role Canadian consulting engineers perform has also not encouraged domestic innovation. In Canada, consulting engineers are hired by paper manufacturers to design entire mills, including machinery standards and specifications. Machinery makers then bid on contracts on the basis of price. This process contrasts with that in Scandinavia, where consulting engineers merely coordinate and oversee the project, awarding contracts for complete systems to the machinery firms with the most innovative and efficient designs. The result is a less dynamic environment in Canada, and one in which Canadian machinery firms have much less incentive to innovate.

Given the size of home demand, Canada's failure to develop an internationally competitive pulp and paper equipment industry is striking, but can be explained by a combination of factors. Investment in advanced factors has been weak. Canadian pulp and paper equipment manufacturers invest an average of one percent of sales on R&D, compared to three percent by Scandinavian firms. The Scandinavians also have extensive vocational and university programs in the industry, while Canada has only limited courses. Although the size of the market is substantial, Canadian demand conditions are also not well suited to innovation. Pulp and paper producers in Canada want proven technology; they are less willing than their Scandinavian counterparts to work with domestic equipment producers to speed innovation. Finally, Canada has few world-class supporting industries able to spur development and raise the sophistication of equipment producers.

F. The Changing Competitive Environment

The failure of most Canadian newsprint producers to keep pace with technical innovation, which was acceptable in the past, is increasingly troubling. By the mid-1970s, the technological revolution of TMP allowed for the cost-efficient manufacture of newsprint using low-quality woodchips. Now countries with inferior quality but fast-growing trees, such as Brazil, Chile and the southern U.S., can produce newsprint that comes close to matching the high quality produced by Canada and the Scandinavian countries.

While Scandinavian firms were quick to respond, the Canadian industry has been slow to adopt TMP technology: in 1987, only about 40 percent of Canada's newsprint pulp furnish material was TMP, compared to 80 percent in Sweden. (By 1990, the Canadian level had risen to approximately fifty percent.) This trailing rate of adoption is at least partially explained by the structure of the Canadian industry. Canadian firms have many older mills which, for local political and economic reasons, are difficult to shut down. The minimum efficient scale of newsprint machines has increased substantially over the past 20 years, rising from 150,000 tonnes per year (tpy) in the 1960s to 220,000 tpy in the 1980s.

While efforts have been made by Canadian producers to upgrade their facilities, Canadian firms, shielded by lower factor costs, still lag behind major competing nations in replacing older, small-scale machines. Between 1981 and 1991, 26 machines with an average capacity of 54,000 tonnes each were shut down, while 18 new machines with an average capacity of 201,000 tonnes started operation. However, other countries' firms are investing even more rapidly, and upgrading more quickly. Between 1985 and 1989, capital expenditures in the newsprint industry averaged $549/tonne in Sweden, $451/tonne in the U.S. South, and $407/tonne in Canada. The U.S. West was the only major producing region with a lower expenditure level than Canada. The result has been slower machine capacity growth in Canada than in many other regions. Between 1985 and 1989, average machine capacity in Sweden grew from 138,000 tonnes to 175,000 tonnes. Over the same period, Finnish machine capacity grew from 157,000 tonnes to 178,000 tonnes. The U.S. South average grew 12,000 tonnes to 146,000 tonnes. Canada's average machine capacity grew 11,000 tonnes over this period, to 104,000 tonnes, still by far the smallest average in the industry. Again, the difficulty of closing Canadian mills, which are often located in single industry towns or regions with few other viable industries, has limited firms' flexibility and slowed the process of rationalization. In fact, governments have played an active role in subsidizing uneconomic facilities. Average machine capacity in Canada will certainly rise throughout the 1990s, but in the meantime the industry has numerous uncompetitive and technologically lagging facilities.

One further explanation sometimes offered for the lack of upgrading in the newsprint industry is the degree of foreign ownership (about 40 percent). Americans own 27 percent of Canadian newsprint capacity (half by U.S. newspaper chains), and firms from other nations such as Japan and New Zealand own the remaining 13 percent.[7] In fact, on the whole, it has been the foreign-owned companies that have been investing most heavily in large, efficient facilities: average capacity in solely Canadian-owned mills is 198,000 tonnes, compared to 218,000 tonnes for joint ventures with foreigners, and 271,000 tonnes in completely foreign-controlled mills. While this is partially explained by the age of Canadian mills, it appears that foreign-owned firms often bring a different approach and mindset to the industry.

G. Potential Threats

Although still by far the world's principal newsprint exporting nation, Canada slowly is beginning to lose market share. In 1989, it had a 58.7 percent share of world exports by volume, compared to 60.4 percent in 1985. In the period 1985-89, Canada's newsprint exports grew at a compound rate of 1.8 percent per year compared to a world average of 2.5 percent. The regions with the fastest export growth were the U.S. (14.8 percent), the European Community (14.5 percent), Latin America (11.6 percent) and Oceania (9.8 percent).

In virtually every case, the nations experiencing fast export growth are those that have taken greatest advantage of thermomechanical pulping technology and are producing newsprint from fast growing, traditionally low quality trees. Trees in Brazil, Chile, Spain and Australia have much shorter growing times -- 20 years in Latin America, compared to 100 years in Canada; many of these nations also enjoy low-cost electrical power, particularly Brazil. Because it allows southern trees to be used to produce newsprint, TMP poses an important challenge to Canada's key competitive strength in newsprint, its basic factor advantages. Producers in the Southern U.S. are a particular threat because, like Canadian firms, they also have easy access to the American market. However, even if Canadian firms accelerate the shift to TMP, the problem of slower growing trees will remain.

Canada's traditional cost advantage is being further eroded by the rising cost of its wood fibre. Over time, Canadian producers have had to go further to reach mature trees, and thus incurred increasing transportation costs. To compound the problem, many Canadian forest leases have only recently included requirements for reforestation. Historically, many pulp and paper manufacturers have exploited forests close to their production sites without extensive reforestation efforts. Once again, this reflected a static cost minimization mindset rather than a more dynamic long--term view of competitiveness.

Fortunately, impressive improvements in reforestation have been made in Canada over the last 10 to 15 years. From 1976 to 1988, the proportion of harvested land that was successfully regenerated rose from 66 to 81 percent.[8] In the future, however, Canada's weak historical reforestation record will hamper the competitive position of its forest industries, as they must still incur the cost to reforest some previously harvested land.

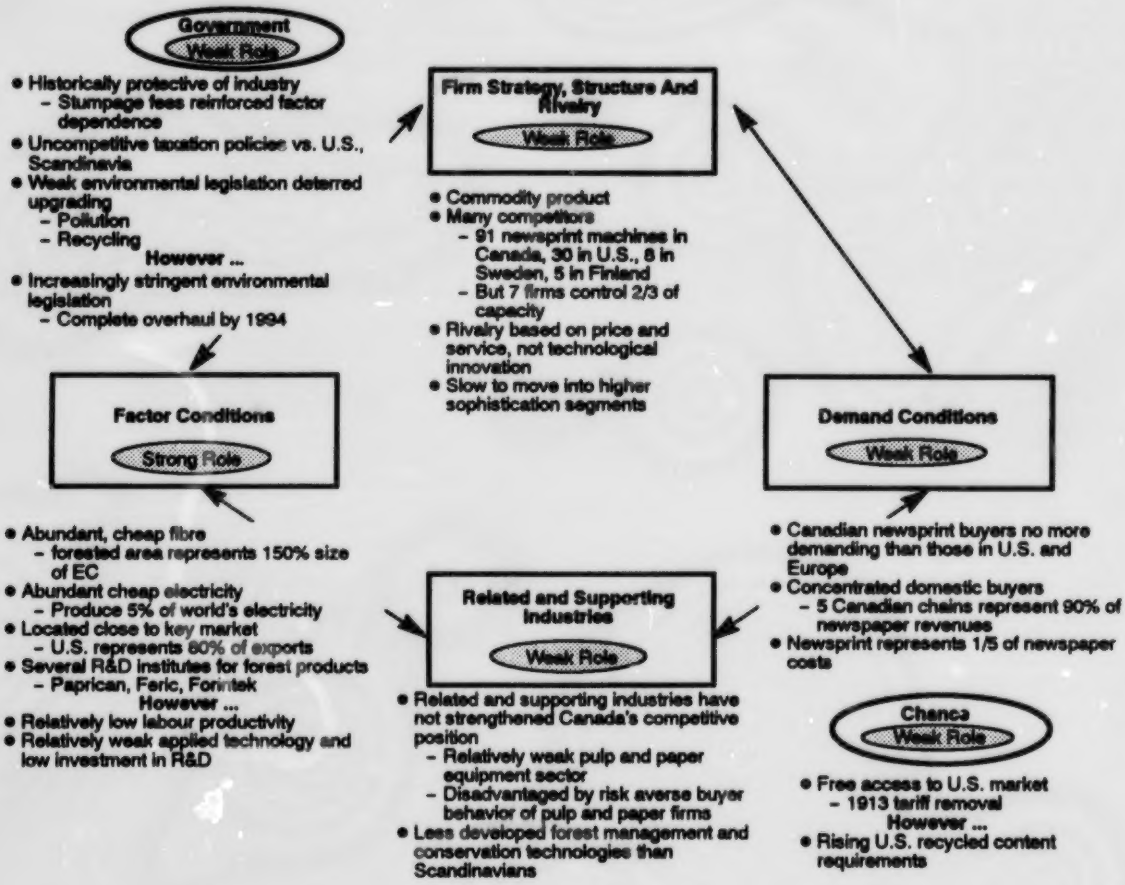
Until recently, the 1986 Canada-U.S. softwood lumber accord also contributed to rising wood costs for Canadian producers. The controversial 1986 accord, in which the Canadian government imposed a 15 percent tax on exports of softwood lumber to preclude the imposition of U.S. import duties, has increased costs for pulp and paper producers as lumber producers pass on their higher costs. Since Canadian producers now generally lack the ability to pass increased costs on to their customers because of stiff international competition, the higher input costs have adversely affected firms' profitability.

Canada's eroding cost position does not necessarily mean that lower-cost nations will threaten Canada's export dominance in the short term. It does suggest, however, that these competitors are well placed to chip away at Canada's export position over time. It also suggests that the future competitive success of Canadian producers will increasingly depend on their ability to raise productivity through innovation and pursue markets for fine paper and other more sophisticated products.

Another threat to Canada's favourable cost position stems from recent recycling legislation reflecting increasing market demand for environmentally friendly products. Various U.S. and Canadian jurisdictions are implementing legislation requiring that up to 50 percent of the content of all newsprint sold in their jurisdictions be made from recycled fibre. Toronto, for example, recently passed a bylaw requiring that 50 percent of fibre contained in newsprint sold in Toronto be recycled by January 1992.[9] Such laws are creating a host of problems for the Canadian newsprint industry. Canada does not recycle enough newspapers to meet pending demand for recycled newsprint. Indeed, even if newspaper recycling were widespread in Canada, the volumes of domestic recyclable material available would be small in relation to the size of the Canadian industry. As a consequence, Canadian firms have begun to invest in recycling capacity such as de-inking facilities and to import old newspapers from the United States. The newly accessible "urban forest" in the U.S. represents an alternative fibre supply, one that could further erode Canada's natural advantage.

U.S. newsprint producers are in a good position to take advantage of this move toward recycled fibre. They are investing heavily in recycling technology and have ready access to vast urban forests. At the same time, some are further improving their competitive position by investing in TMP technology. Some 80 percent of Canada's newsprint exports are destined for the U.S., but Canada has been supplying a declining share as imports represent a smaller proportion of the U.S. market in recent years. With the advent of legislation mandating the use of recycled fibre and increasing pressure from the marketplace, this declining trend seems likely to continue and perhaps accelerate.

Figure 4.2
DETERMINANTS OF NATIONAL COMPETITIVE ADVANTAGE – NEWSPRINT



Government
Weak Role

- Historically protective of industry
  - Stumpage fees reinforced factor dependence
- Uncompetitive taxation policies vs. U.S., Scandinavia
- Weak environmental legislation deterred upgrading
  - Pollution
  - Recycling

However ...

- Increasingly stringent environmental legislation
  - Complete overhaul by 1994

Firm Strategy, Structure And Rivalry
Weak Role

- Commodity product
- Many competitors
  - 91 newsprint machines in Canada, 30 in U.S., 8 in Sweden, 5 in Finland
  - But 7 firms control 2/3 of capacity
- Rivalry based on price and service, not technological innovation
- Slow to move into higher sophistication segments

Factor Conditions
Strong Role

- Abundant, cheap fibre
  - forested area represents 150% size of EC
- Abundant cheap electricity
  - Produce 5% of world's electricity
- Located close to key market
  - U.S. represents 80% of exports
- Several R&D institutes for forest products
  - Paprican, Feric, Forintek

However ...

- Relatively low labour productivity
- Relatively weak applied technology and low investment in R&D

Demand Conditions
Weak Role

- Canadian newsprint buyers no more demanding than those in U.S. and Europe
- Concentrated domestic buyers
  - 5 Canadian chains represent 90% of newspaper revenues
- Newsprint represents 1/5 of newspaper costs

Related and Supporting Industries
Weak Role

- Related and supporting industries have not strengthened Canada's competitive position
  - Relatively weak pulp and paper equipment sector
  - Disadvantaged by risk averse buyer behavior of pulp and paper firms
- Less developed forest management and conservation technologies than Scandinavians

Chance
Weak Role

- Free access to U.S. market
  - 1913 tariff removal

However ...

- Rising U.S. recycled content requirements

H. Summary

Canada's share of world newsprint exports remains high. The country has a wealth of basic factor inputs to the newsprint industry and is located next to the largest world market for newsprint. Natural resource advantages have enabled Canadian newsprint manufacturers to maintain a cost position that is competitive with their traditional rivals, Scandinavian and U.S. producers.

But Canada's success in newsprint is at risk. Even prior to recent changes, some Canadian firms have foregone opportunities to improve productivity at certain facilities and, therefore, their overall profitability. As recent technological changes and the emergence of new supplier nations progressively erode Canada's traditional advantage, lost opportunity is turning into a threat. Canadian firms find that they lack other favourable determinants to defend and upgrade their positions.

The Canadian newsprint industry has many features in common with other Canadian resource-based industries we examined. Factor abundance encouraged Canadian newsprint firms to take a conservative attitude toward innovation and to leveraging their natural advantages, an attitude that has persisted among many firms for most of the industry's history. Canadian firms generally still prefer to wait for competitors in foreign countries to prove new technologies before adopting them. Government policy has reinforced the reliance on basic factors. It has reduced the pressure to improve technology and productivity and reduced pressure to shift into higher value-added products, by helping to keep input costs relatively low and by moving to tougher environmental regulations -- although this situation has begun to change in recent years.

Patterns of rivalry within the industry have also dampened the pressures on Canadian newsprint companies to upgrade. Firms have competed largely on the basis of price. Any tendency to compete on the basis of technology and innovative products has been muted. This has served to limit dynamism. At the same time, little impetus or support for innovation has been provided by home-based related and supporting industries. Canadian pulp and paper equipment suppliers, for example, are generally small companies with minimal R&D efforts. Even firms attempting to upgrade face constraints in supporting industries as well as in local skill and technology access.

Over time, the characteristics discussed above have resulted in an industry that has enjoyed resource rents due to Canada's traditional factor abundance. These rents have been split among companies (which have been profitable and able to meet world prices without investing in advanced equipment), labour (which is paid more than labour productivity might dictate), local communities (which have kept mills that otherwise might have been closed), with some portion lost to inefficiency. It is not surprising that this pattern has evolved. Maintenance of this old order, however, requires that Canada's resource base remain significantly superior to that of its competitors. As technological advances, recycling legislation, growing foreign production, and increased resource costs start to undermine Canada's position, the lack of state-of-the-art pulp and paper education and research, of world-class related and supporting industries, of a strong tradition of technological innovation, and of real rivalry are becoming more of a problem.

Canadian firms have recently begun to address these issues. Many have begun to modernize and rationalize their facilities. Small, uncompetitive mills are being closed, and average capacity of newsprint machines is increasing each year. It is estimated that the industry will spend up to $5 billion to modernize existing plants, partly because of the need to meet significantly tougher environmental regulations. Large investments are being made to bring mills up to world-class standards.

Restructuring of the newsprint industry will be a long and difficult process, but it is vital if the industry is to remain a strong world competitor. The questions now are whether Canadian firms can develop the skills and capabilities necessary to develop new advantages in a more competitive environment, and whether the Canadian diamond can facilitate and support the upgrading and improvement required. This set of challenges is not unique to the newsprint industry; other industries in Canada's resource sector face similar ones.

2. THE CENTRAL OFFICE SWITCH INDUSTRY

The central office switch industry is one of Canada's most successful manufacturing industries and offers a sharp contrast to newsprint. In central office switches, Canada's advantage in the world market stems from a record of successful innovation by Canadian firms. Drawing from a favourable Canadian industry diamond, these innovations have been reinforced by effective government policies and important chance events.

The telecommunications equipment industry supplies the hardware and software necessary to transmit voice, data, text, and video signals from one location to another. Total world telecommunications equipment expenditures in 1989 were about U.S. $100 billion, with central office switches representing the largest segment, approximately 25 percent. Other segments include transmission, Private Branch Exchange (PBX) and key systems, data communications, mobile communications and satellites.

A Canadian company, Northern Telecom (known as Northern Electric until 1976), has been a world leader in the production of central office switches for the past 15 years. Canadian export figures do not reveal the strength of NT's international position due to the high level of direct investment abroad. In 1989, NT ranked first in the world in the central office switch market in terms of market share, with 17.4 percent, ahead of much larger firms such as Alcatel (15.2 percent), AT&T (11.9 percent), NEC (7 percent) and Siemens (5 percent). Unlike most of its competitors, NT's business is focused almost exclusively on telecommunications equipment.

Figure 4.3

SHARE OF DIGITAL LOCAL LINES PLACED IN SERVICE, 1989

COMPANY	HOME COUNTRY	WORLD SHARE
Northern Telecom	Canada	17.4%
Alcatel	France	15.2%
Ericsson	Sweden	14.5%
AT&T	U.S.	11.9%
GEC Plessey	U.K.	8.0%
NEC	Japan	7.0%
Siemens	Germany	5.0%
Hitachi	Japan	5.0%
Oki	Japan	5.0%
Fujitsu	Japan	3.0%
Italtel	Italy	3.0%
AG Communication	U.S.	3.0%
Nokia	Finland	1.0%

SOURCE: NORTHERN BUSINESS INFORMATION / DATAPRO, "WORLD PUBLIC SWITCHING MARKET: 1990 EDITION"

A. Products

Central office switches perform two main functions. First, they make local connections between one subscriber's line and another's. This basic switching operation has the following components: identification of the calling and called parties, and completion of an electrical circuit linking them; maintenance of the circuit until the switch is instructed to terminate the linkage; and termination of the call. Second, switches permit a large number of local lines to access a smaller number of external trunk lines between exchanges.

A majority of the switches in use today are software-driven digital or analog store-program-control switches. A new switch takes up to five years for initial development, at a cost of approximately U.S. $1 billion. Subsequent work to eliminate flaws and provide advanced features can cost another $200 million per year. In total, the cost of developing a new digital switch is typically between $1-2 billion, of which about 75 percent is for software and 25 percent for hardware. These huge expenditures are about 10 times larger than the development costs for previous generations of switches. The next generation of central office switch technology, optical switching, could see development costs three times higher than those for digital central office switches.

Local telecommunications carriers (telcos) are the main buyers of central office switches, with a small proportion sold to organizations for private communications systems. Examples of the latter are government agencies and large companies -- such as General Motors -- which operate their own internal telecommunications systems.

B. North American Historical Overview

Alexander Graham Bell is said to have invented the telephone near Brantford, Ontario, in July 1874 when he described the idea to his father, Professor Alexander Melville Bell, while vacationing at the Bell homestead. Bell first successfully transmitted speech electronically on March 10, 1876. Later that same year, the first "long-distance call" was placed from Brantford to Paris, Ontario, over 16 km of telegraph company lines. The Bell Telephone Company was formed in the U.S. on July 9, 1877. In 1881, the company purchased a controlling interest in Western Union's electrical equipment manufacturing subsidiary, Western Electric -- Bell's major rival at the time. Bell reorganized several times and emerged as AT&T in 1900. In 1909, AT&T purchased Western Union. In 1913, under antitrust pressure, AT&T agreed to sell Western Union, and to interconnect with all non-Bell companies requesting access to its network. Four decades later, in 1949, the Justice Department filed suit against AT&T for violation of U.S. antitrust laws, alleging that its vertical integration into equipment manufacturing inhibited competition. In 1956, the case was settled with a consent decree that obligated AT&T, Western Electric and Bell Labs to license patents for use by other firms.

The Bell Telephone Company of Canada was formed in 1880 as a subsidiary of the American company. Originally, Bell Canada was chartered to provide telephone service to the whole of Canada, but the geographic and economic challenges of building a Canada-wide telephone system proved too formidable for the fledgling company. Significant for the later development of the industry, the result was that other companies emerged across the country. Non-Bell companies served British Columbia from the beginning. During the 1880s local interests purchased the Bell facilities in Prince Edward Island, Nova Scotia, and New Brunswick. Populist movements in the early 1900s fostered the establishment of government-owned telephone systems in Manitoba, Saskatchewan, and Alberta, which acquired Bell Canada's telecommunications facilities in those provinces. This patchwork of companies -- which continues to this day -- has played an important role in the development of a competitive central office switch industry in Canada by providing multiple buyers and a quasi-competitive market for switching equipment.

In 1882, Western Electric formed a Canadian subsidiary, Northern Electric and Manufacturing Company, in order to circumvent high Canadian tariffs on imports of equipment. Northern Electric and Manufacturing was officially incorporated on December 7, 1895. In 1906, Bell Canada purchased a controlling interest in the company, and in 1914 it was merged with Imperial Wire and Cable Company to form Northern Electric Company.

Canada's vast geography and sparse population made the task of interconnecting all of the independent telephone systems in the country unusually complex. In the early days, many of the long-distance calls between Canadian cities were routed through the more advanced American telephone system because of the lack of long-distance circuits in Canada. To address this problem, the nation's largest telecommunications carriers formed the Telephone Association of Canada in 1921 to assist in the development of a nationwide telephone system. Canada's first transcontinental telephone network was completed in 1932.

C. History of Central Office Switching Systems

The earliest type of switching system, in which an operator switched calls manually, is familiar from old movies. First installed in 1878, in New Haven, Connecticut, the manual switch was based on designs used in telegraph switches. The manual switchboard included jacks that were each connected to an individual line, and a set of cords that had plugs on each end. The operator completed the telephone circuit by plugging the ends of the cord into the two correct jacks to allow the parties to speak to one another.

Automatic public switches soon replaced this awkward system, and have subsequently evolved through four major generations: strowger, crossbar, electronic, and digital toll. Throughout the past century, from strowger to digital switching, AT&T has been the dominant force in technological innovation. Almon Strowger and his nephew, Walter Strowger, patented the Strowger (or step-by-step) switching system in the U.S. in 1889. The first installation was in La Porte, Illinois, in 1892, by an independent telephone company. Noisy and difficult to maintain, the system had a large number of moving parts. The equipment was also bulky and required a large facility to house it. However, the "Plain Old Telephone Service" (POTS), connecting two basic telephone subscribers, was quite reliable.

The invention of the original crossbar switch is credited to a Swedish engineer, G. A. Betulander, who used aspects of a 1913 patent by Western Electric's J. N. Reynolds to design the crossbar switch in 1919. It did not take hold in the market until further research and upgrading were performed in the United States. The first crossbar switch was put into service by AT&T in 1938 in New York City. Crossbar switching evolved out of the step-by-step switch, but was smaller and separated the switching and control functions. It established connections under the control of circuits called markers, which mark a path through the network. Unlike its predecessor, the crossbar switch waited until all the digits were dialed, and then dialed them all simultaneously. The system allowed more calls to be handled at once and required less maintenance. The crossbar switch was very successful, and versions of it remain in service today.

AT&T again introduced the next generation of technology -- electronic analog central office switches -- in the 1960s. Electronic controls replaced the mechanical parts of the previous switches. These electronic switches created a route through the switch for each connection. All the system intelligence and control instructions which made up the operating program were stored in memory units, hence their name store-program-control. Offering greater flexibility and higher speed, this system changed the focus of R&D in the central office switch industry from hardware to software. Revenue-producing features could be added to the switch by changing the program instruction set. Meanwhile, the introduction of transistors made it possible to electronically sample a conversation, and interleaf several conversations which could then be transmitted and reconstructed at the other end. Known as time division switching, this process greatly increased the efficiency of line and switching facility utilization.

AT&T first announced digital toll (long distance) central office switches in 1976, for delivery in 1978. These were designed to switch calls between local central office switches. Within the digital toll switch, digital transmission is similar to electronic time division transmission, except that in electronic time division the sampled conversation is sent as an analog (wave form) signal, while in digital transmission the samples are converted into binary pulses. Digital technology eliminates the distortion inherent in analog transmission and allows for very high speed transmission.

D. Sophisticated Canadian Demand for Telecommunications

Since the invention of the telephone in 1874, Canada has enjoyed one of the highest telephone penetration rates in the world.[10] Canadian consumers of telephone services became accustomed to high quality and low cost despite the vast geography, harsh climate, and sparse population that made telephone service difficult to deliver. The government's early decision to allow private ownership of telcos, coupled with the requirement of universal access, forced carriers to be very demanding buyers of telecommunications equipment.

Some examples of the sophistication of Canadian demand include the 1958 inauguration of the world's longest microwave transmission system, consisting of 139 stations, stretching 5,400 km from Sydney, N.S., to Victoria, B.C.; Bell Canada's completion of the world's first tropospheric scatter system to provide cost effective service to remote areas of the eastern Arctic in the 1950s; the launch in 1972 of Anik I, the world's first geostationary domestic satellite; installation of the world's first nationwide digital data transmission network (completed in 1973); and the first local digital central office switch (announced in 1976).

The existence of numerous carriers, combined with the relatively small Canadian market, caused NT to be concerned with signal compatibility (to allow transmission between different switching equipment) earlier than other switch makers. This helps explain why NT was the first to use the modular design that has now become a standard tool for differentiation among central office switch makers. Some of Canada's numerous telecommunications carriers instituted competitive bidding procedures for equipment. This encouraged suppliers in the Canadian market to be more flexible than their counterparts in some foreign countries, where the carriers had domestic monopolies on service and a single captive supplier. Accordingly, as foreign markets came to embrace competitive bidding, NT was well placed.

However, while competitive bidding was an important element of demand, there was also a unified technical standard across most of Canada, because of service agreements which Bell had with telcos in other provinces. Thus the structure of the Canadian carrier industry led to consistent demand among many more numerous entities, facilitating the adoption of upgraded technology throughout the Canadian network and providing greater volume per switch type.

Canadian demand was particularly influenced by Bell Canada's purchasing agreement with Northern Telecom. Unlike telecommunications equipment manufacturing firms in

Europe and Asia (which were often manufacturing arms of the domestic Post, Telegraph and Telephone), NT was not guaranteed a captive domestic customer. In accordance with the agreement, NT had to provide equipment to Bell Canada at or below the best price that it would supply outside telcos. This forced NT to be cost competitive in all of its markets.

Canadian demand was also compatible with U.S. demand in terms of technical standards. This allowed NT to supply similar equipment to both markets more readily than other foreign suppliers, which had to modify their product for the North American market. It also allowed NT to more easily tap into sophisticated American demand conditions, generating further pressure to innovate in both products and services.

E. The Emergence of the Canadian Industry

The combination of high Canadian tariffs and receptivity to foreign investment led American firms to establish Canadian subsidiaries in the late 1880s and early 1900s. NT (the main supplier to Bell Canada) and GTE Automatic Electric (the main supplier to B.C. Tel) were both subsidiaries of U.S. companies. Throughout the first half of the twentieth century the adoption of new generations of central office switch technology in Canada trailed the U.S., and all major technological advances in the industry were pioneered in the United States. It was not until the second half of the century that a chance event provided the impetus for change in the Canadian central office switch industry.

I) Positive Role of Chance

In 1956, a U.S. antitrust investigation led to a consent decree severing the existing linkage between AT&T, Western Electric, Bell Labs and NT. As part of the consent decree, Western Electric sold its 40 percent minority interest in NT to Bell Canada, thus creating the modern, Canadian-owned, Northern Telecom. Prior to the divestiture, NT had operated as a branch plant, with a product line that usually trailed that of its U.S. parent by two to three years. At the time of the consent decree, NT had little R&D experience in major technologies, although it did have excellent engineering and manufacturing skills. Bell Canada and NT agreed that NT should pursue a strategy of internal technology development by conducting its own R&D rather than simply using the design capabilities and technology of Western Electric and Bell Labs.

Having no product line of its own, NT continued to license many Western Electric products, but the relationship between the two soon began to weaken. NT's initial strategy was to clone existing technology, adding slight modifications and improvements to suit the Canadian market, and then to sell its products to Bell Canada, its primary customer whose appetite for sophisticated equipment encouraged innovation by NT.

II) Investment in Advanced Factors

In 1958, Northern Electric Laboratories was established in Belleville, Ontario, with a staff of about 35. This began the process of creating an advanced and specialized knowledge base in Canada. The Canadian high-tech community surrounding the Ottawa area is built on the foundation laid in the 1950s, when the Canadian government established the National Research Council in Ottawa. Northern Labs moved to Ottawa in 1960. Its principal goal was to acquire expertise in designing switching and transmission equipment to fit the needs of the Canadian market.

The SA-1, a 1,000-line crossbar switching system that utilized Western Electric-type components, was the first product developed by Northern Labs. Introduced in the Canadian market in the early 1960s, the product sold over 1,000 units, mostly in Canada. The SA-1 system was based on electro-mechanical technology. NT management realized, however, that electronics would be the key to the next generation of switching technology.

In the early 1960s, Bell Canada maintained a relationship with AT&T in the form of a service contract. Bell was eager to gain access to AT&T's latest switch technology before the termination of this relationship. Bell Canada negotiated a deal with AT&T in which NT would manufacture under license a #1 ESS, AT&T's state-of-the-art electronic switch, for the World's Fair in Montreal (Expo 67). AT&T would win worldwide exposure for its technology, while NT would gain knowledge of the technology resulting from its involvement with Bell Labs and Western Electric as part of the development team. A switch was manufactured and installed by NT for Expo 67; ultimately 11 more of these switches were built under license by NT for its parent, Bell Canada. The #1 ESS was designed for major metropolitan areas (10,000-60,000 lines). It proved too expensive to manufacture on the small scale provided by the Canadian market, so it was phased out of the NT product line in the early 1970s.

III) Strategy Driven by Canadian Demand

The #1 ESS experience refocused NT's strategy toward designing a product line suited to Canadian market demand. By 1964, the basic architecture of the SP-1 (Stored Program), which had store-program-control and miniature crossbar switching, had been outlined. The SP-1 promised to be a robust system that could maintain telephone connections even if a problem developed in the central computer. A decision was made to develop the switch further. The first trial system was installed near Ottawa in November 1969, and the first commercial system began operations in November 1971.

NT's strategy was to market the new system to Bell and non-Bell carriers in Canada and the United States. In Canada, Alberta Government Telephones, Manitoba Telephone, and Sasktel had more competitive buying procedures than Bell Canada. B.C. Tel purchased from NT only when AEL (B.C. Tel's captive supplier) did not supply the item, or could not meet a delivery schedule. In the U.S., the major independent carriers generally used competitive tender for equipment purchases, except for GTE affiliates which purchased from within. NT made its first non-Bell sale of an SP-1 to

Alberta Government Telephones, and its first U.S. sale to Elyria Telephone Company of Ohio in June 1974. These sales prompted NT to hone its export and marketing skills, and to develop equipment which was more compatible with other manufacturers' offerings earlier than competitors with large home demand. NT was pushed to compete in open markets at a time when many equipment suppliers in other countries were still focused on captive markets.

By 1975, every major telephone company in Canada had purchased SP-1s and the switch held 90 percent of the Canadian market. Improved versions of the SP-1 were developed that could route up to 25,000 local and toll lines. The switch allowed small telephone companies to track accurately their toll revenues and play a significant role in handling their own profitable toll business. This feature, designed for the fragmented Canadian market (which had 1,490 telephone companies in 1971), was especially important in marketing to independent telephone companies in the U.S. (eight percent of the U.S. market), who were regularly in conflict with AT&T over the division of toll revenues.[11] The SP-1 was regarded by non-AT&T companies as the premium store-program-control switch, and 25 percent of SP-1 sales in 1974 were to the United States. The SP-1 switch provided NT with its first major foreign success, and proved that a product designed to meet sophisticated and specialized Canadian demand conditions could find a world market.

iv) Continued Investment in Specialized Research

By 1970, Northern Electric Labs had become a major R&D organization employing 2,000 people. The decision was made to incorporate it on January 1, 1971, as Bell-Northern Research Ltd. (BNR). Initially, the new company was 49 percent owned by NT, and 51 percent by Bell Canada. It maintained close working relationships with both companies. BNR's role in the development of a specialized knowledge base for telecommunications in Canada in the 20 years since its creation is one of the most critical sources of competitive advantage for NT.

NT's close relationship with Bell Canada gave it (and BNR) information about the evolving requirements of telephone operating companies, helping NT to set product specifications for new product development. Bell Canada typically identified its switching requirements two to three years in advance and provided detailed descriptions one year in advance, at which time NT would quote a price for the equipment.[12] Bell's demanding specifications, more rigorous than those of many other telcos around the world, coupled with the close Bell-NT relationship, fostered ongoing innovation at NT.

v) Growing Canadian Rivalry

BNR has also led indirectly to numerous successful spin-off companies, among them Mitel and Newbridge Networks. Mitel, based in Kanata, Ontario, was founded by Michael Cowpland and Terry Matthews in 1972. They had worked briefly for Micro Systems International, an Ottawa-based spin-off from NT in the mid-1960s that was eventually closed. Mitel designed an innovative small PBX, and by the late 1970s was a world leader in sale of PBX equipment in the under-100 line category. NT also produces PBXs, and Mitel provided stiff competition in this product line. (By contrast, most of NT's foreign competitors do not face any domestic competition.) Mitel has since entered the central office switch industry with the GX5000. Mitel manufactures automated PBX, keyphone systems, public switching systems and semiconductors. In 1988 it ranked sixth in the world in the number of lines of automated PBX capacity shipped, and has sold products in over 100 countries. Mitel's 1990 revenues were $427 million.

In 1986 Terry Matthews formed a new firm, Newbridge Networks, also based in Ottawa. Already a world leader in multiplexers, its sales in 1989 exceeded $120 million and it has sold its products in 40 countries. Thus, the beginnings of world-class domestic rivalry are emerging in the Ottawa region.

Competitiveness in the closely related and highly competitive PBX industry also had a significant impact on the future of NT's central office switch business. In 1972, BNR demonstrated a large-scale integration codec (coder/decoder) that would prove to be a critical element in the SL-1 PBX introduced in 1975. The SL-1 also incorporated pulse code modulation, time division multiplexing and store-program-control. All of these crucial technologies were later incorporated into the development of NT's new generation of digital central office switches.

vi) Innovation in Response to Competitive Pressure[13]

As sales of the SP-1 central office switch grew, pressure from NT's competitors intensified. In 1974, 44 percent of the world's 357 million telephones were located in the U.S. and Canada, with major manufacturers from North America, Europe, and Japan all competing for a share of this market.[14] Western Electric (the world's largest manufacturer of central office switches at the time), GTE, and North Electric (the manufacturing arm of United Telecommunications) all introduced new switches for the North American market that would compete with the SP-1. International Telephone and Telegraph (ITT), then Europe's largest supplier of telephone equipment, and NEC also began offering switches to the North American market. At the same time, Ericsson was developing its AXE series, which was thought by many to be superior to the SP-1.

In light of the competitive situation, a three-person task force, composed of one representative each from NT, Bell-Northern Research, and Bell Canada, was formed in 1975 to develop a strategy for the central office switch market. At the time two major alternatives were considered.

The first option was to continue with the exploratory research on the digital switching that had been going on since the late 1960s, but delay the introduction of digital central office switches until 1981. This option would extend the life cycle of the basic SP-1 technology, which could be enhanced to combat the intense competitive pressures this switch was facing at the time, while minimizing development costs since no major leap in technology was required. The second alternative was to make a major commitment to develop an entirely new digital central office product line, to be introduced as soon as possible. Initial development was already underway, and with the commitment of substantial funds it was believed that the first elements of the new line could be available in 1979. This option was considered to be very risky since the introduction of a new product line would curtail the sales of the SP-1 at a time when it was experiencing rapid growth. Moreover, the adoption of digital systems was not widely expected to occur until the early to mid-1980s.

In early 1975, the task force recommended that the second option be chosen and less than one year later a full line of digital products called Digital World was introduced. This strategic decision once again reflected the influence that Bell Canada had in stimulating NT to upgrade its technology to satisfy both home and foreign demand. The decision proved anticipatory, as AT&T did not expect demand for digital local central office switches to be significant for several years.

vii) An Aggressive and Responsive Strategy

The decision to develop a digital product line was supported by NT's strategy in the mid-1970s. The major elements of the strategy were the following:

- Spend heavily on R&D to develop its own integrated circuits, unlike many rivals who relied on independent integrated circuit vendors (this would provide NT with an advantage over rivals by giving it greater control over delivery schedules, and by keeping circuit designs proprietary);
- Use Bell Canada's network as a testing ground for new products;
- Use its relationship with Bell Canada as a source of product credibility;
- Employ an open architecture in the creation of new products that could be easily updated with improved software, thereby reducing the risk of obsolescence for the telephone carrier, and increasing follow-on sales; and
- Increase sales volume outside of Canada, since the Canadian market alone could not absorb the high level of R&D expenditures needed to remain at the forefront of technology. This latter objective was to be accomplished by boosting exports, establishing manufacturing facilities outside Canada, and using strategic alliances in foreign countries in order to gain access to their domestic markets.

viii) Well Positioned to Exploit Chance

A second major chance event in the evolution of NT occurred in 1978, when AT&T's monopoly in the provision of U.S. telecommunications service was challenged. The U.S. antitrust suit alleged that AT&T had excluded competition in the telecommunications equipment market by purchasing almost all of its required equipment from Western Electric. The suit placed pressure on Bell Operating Companies (BOCs) to buy from other suppliers in order to disprove the allegation. The BOCs turned to NT's digital central office switch because of the technical advantages offered by digital technology, and also because of the pressures imposed by the antitrust suit.

NT's strategic choice to develop a line of digital central office switches, coupled with this chance event, was the springboard to its current position as one of the global leaders in central office switch design and manufacture. By 1984, NT had over 85 percent of the digital central office market in the U.S., despite Western Electric's introduction of a digital local central office switch, the #5-ESS, in 1982.[15] From the time Digital World was announced in 1976 until AT&T's divestiture took place in 1984, NT's central office switch revenues jumped from approximately U.S. $300 million to U.S. $1.45 billion. NT's digital central office switching systems are now installed in 25 countries around the world, including Japan and the U.K., and 1990 switching revenues were U.S. $3.7 billion.[16]

F. The Role of Government in Upgrading

Canadian government policy has helped support and catalyze the upgrading of the telecommunications equipment industry in several ways. Looking back, the decision to allow carriers to be privately owned and regulated, rather than government monopolies, proved wise. The most innovative countries in the world, in terms of the services offered, are Canada and the U.S.; they were among the few countries that did not historically have government-owned Post, Telegraph and Telephone companies. Even within Canada, the provinces that experienced the greatest growth in telecommunications equipment industries were British Columbia, Ontario, Quebec, and, to a lesser degree, Alberta. In addition, government's insistence that domestic carriers offer service to all of the remote and sparsely populated areas of the country as a requirement for licensing challenged carriers by forcing them to be technically innovative in order to fulfill this difficult task. Creating challenges, rather than removing them as in the case of newsprint, fostered a truly competitive environment.

G. Potential Threats

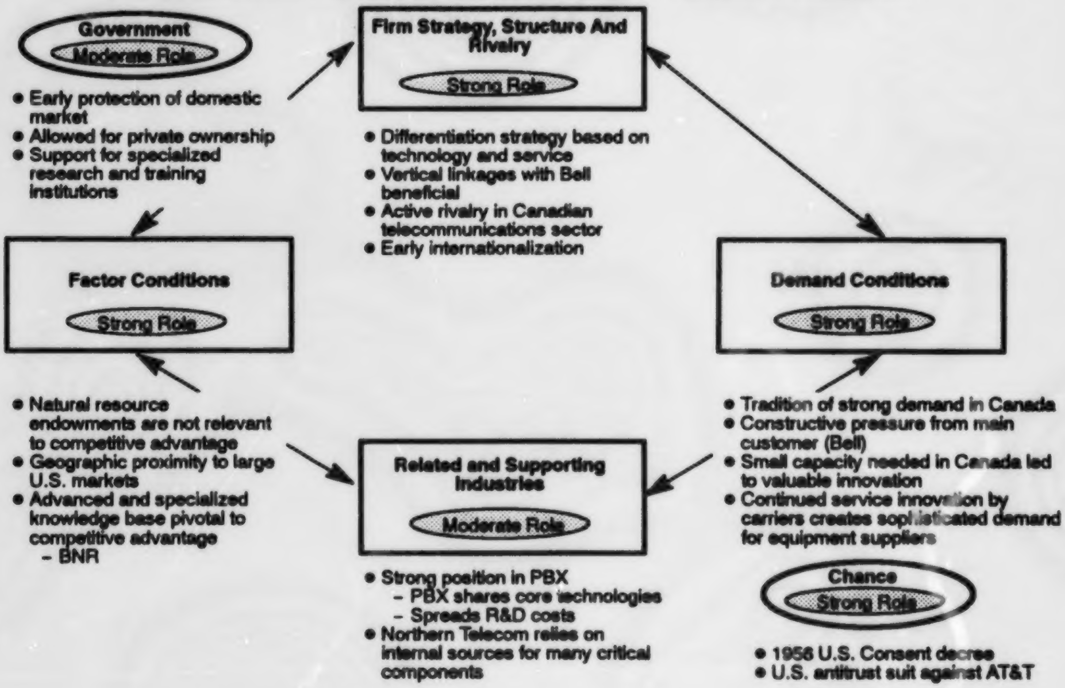
The U.S. is the world's largest and most sophisticated telecommunications equipment market. As such, it is a vital test market for new services and equipment for both domestic and foreign manufacturers. NT and Western Electric are currently the two main suppliers to the seven Regional Bell Operating Companies (RBOCs). However, companies such as NEC, Siemens, Ericsson, and others are all pursuing greater market share in the U.S. The decision to break AT&T up into RBOCs and AT&T Long Distance, which took effect in 1984, has greatly heightened competition among service providers, and in turn created increasingly demanding buyers as carriers strive to improve service, quality and cost. The demand advantages provided by the U.S. market, as well as the greater rivalry in the U.S., raise the question of whether Canada may be losing its relative attractiveness as a home base for Northern Telecom.

There is also concern that the increasing demand for electrical engineers in Canada could outstrip supply in the future. Northern Telecom officials have publicly identified this as a potentially serious problem. If it occurs, it would constitute a potent threat to the knowledge resources critical to the continued international success of Canada's telecommunications equipment manufacturing industry.

Government and industry are responding by improving the advanced knowledge base in Canada. Several bodies have recently been set up to extend the frontier of research and provide specialized graduate level training in this area: the Canadian Institute for Telecommunications Research (CITR) in 1990, the Ottawa-based Telecommunications Research Institute of Ontario (TRIO) in 1989, and the Alberta Telecommunications Research Centre (ATRC) in 1986. Their impact to date has been limited, but all of these centres are designed to upgrade and build on Canada's specialized knowledge base in telecommunications by carrying out pre-competitive, world-class research and advanced training in an effort to enhance the long-term competitiveness of the Canadian industry.

Figure 4.4

DETERMINANTS OF NATIONAL COMPETITIVE ADVANTAGE – CENTRAL OFFICE SWITCH


Government
Moderate Role
• Early protection of domestic market
• Allowed for private ownership
• Support for specialized research and training institutions
Firm Strategy, Structure And Rivalry
Strong Role
• Differentiation strategy based on technology and service
• Vertical linkages with Bell beneficial
• Active rivalry in Canadian telecommunications sector
• Early internationalization
Factor Conditions
Strong Role
Demand Conditions
Strong Role
• Natural resource endowments are not relevant to competitive advantage
• Geographic proximity to large U.S. markets
• Advanced and specialized knowledge base pivotal to competitive advantage
– BNR
Related and Supporting Industries
Moderate Role
• Tradition of strong demand in Canada
• Constructive pressure from main customer (Bell)
• Small capacity needed in Canada led to valuable innovation
• Continued service innovation by carriers creates sophisticated demand for equipment suppliers
• Strong position in PBX
– PBX shares core technologies
– Spreads R&D costs
• Northern Telecom relies on internal sources for many critical components
Chance
Strong Role
• 1956 U.S. Consent decree
• U.S. antitrust suit against AT&T

H. Summary

Central office switches is one of the few Canadian industries we studied in which all elements of the diamond have contributed in important ways to Canada's competitiveness. The conspicuous and sustained success in this industry is therefore not surprising.

Well developed and constantly improving knowledge resources have been a vital important source of competitive advantage to Northern Telecom. More important to

NT's success in central office switches, however, is the advanced and specialized knowledge resources in telecom design and optics that have been developed at Bell-Northern Research Labs and its predecessor, Northern Labs. Bell-Northern Research is now the largest privately owned research lab in Canada, employing 4,400 people in 1989. Relative to its international competitors in the telecommunications equipment industry, NT consistently ranks among the leaders in terms of R&D as a percentage of sales, spending approximately 12 percent in 1990.

Canadian demand for telecommunications equipment has always been highly sophisticated by international standards. NT's purchase agreement with Bell Canada pushed NT to be innovative. As scale economies in the central office switch market grew and the industry became more global, NT was forced to look to foreign markets earlier than most of its competitors. Although today there is only one Canadian player of consequence in the central office switch industry (Microtel, B.C. Tel's captive supplier, exited in 1989), rivalry in the larger North American market is intense. This has strongly encouraged NT to develop state-of-the-art technology. Because service is critical to buyers, the physical proximity of Canada to the U.S. aided Canadian telecom equipment manufacturers in their initial exporting phase. The U.S. market provides a large and sophisticated base of demand that is easier to serve from Canada than from overseas.

Spillover effects from related industries have helped to drive innovation in central office switches. However, NT has internalized the sourcing of many critical components. NT has also benefited from PBX equipment rivalry in Canada. This rivalry has spurred innovation that facilitated the development of the digital central office switch. Vertical integration of NT and Bell Canada provided a direction for new innovation. Aggressive strategic response to the needs of smaller switch buyers, and willingness to internationalize sales early, proved very successful.

Chance events have also had an influence on the Canadian industry. Until the 1956 U.S. consent decree, NT was basically a sluggish subsidiary that copied U.S. technology. Almost immediately after its home base was relocated to Canada, it began developing an advanced and specialized knowledge base in Canada and new products that successfully serviced the Canadian market.

The central office switch industry offers lessons for other Canadian industries. It shows that Canadian firms can succeed in extremely scale-sensitive industries by competing globally -- the central office switch industry is one of the most scale-sensitive of all industries. NT's success shows that Canadian companies need not be constrained by the size of the domestic market. They can take advantage of the U.S. market and selectively tap into other favourable conditions in the U.S., although there are limits to this strategy. NT has taken advantage of the size and sophistication of the U.S. market for both sales and product development.

If the U.S. diamond becomes increasingly more attractive than the Canadian diamond, a larger proportion of NT's activities will likely migrate to the U.S. While this would not be a problem for NT as a company, retaining the firm's most valuable activities in Canada is a desirable national goal. Although the majority of NT's basic research continues to be done in Canada, and recent corporate announcements confirm that major research investments continue to be made here, the relocation of the Public Network's division headquarters to the U.S. is evidence of the attractiveness of the U.S. diamond.

Finally, the central office switch case serves as a useful reminder that individual firms -- not governments -- must take the lead in creating and exploiting competitive advantage. The importance of NT's strategic decisions and willingness to invest in creating its market position cannot be overemphasized. While the external environment was favourable to the development of the industry in Canada, it was up to NT to take advantage of that environment and make the commitments and investments necessary to succeed.

3. THE CANADIAN WHISKY INDUSTRY

Whisky is one of Canada's few internationally successful consumer products industries. It has historically benefited from close proximity to the U.S. market and chance events there, notably Prohibition. A vibrant industry grew up based on Canada's factor strengths in grains and the art of distilling, high per capita domestic demand, and entrepreneurial rivalry between family businesses. But as competitive advantage has shifted to distribution channels and the promotion of international brands, and per capita consumption of whisky in North America has fallen, the vitality of the Canadian-based industry has faltered.

Canadian exports reached $415 million in 1989, representing over three-quarters of Canadian production and about 12 percent of world exports. Canadian whisky has made inroads into virtually every foreign market, including South-East Asia and Eastern Europe. The U.S., however, remains by far the largest foreign market, accounting for over 90 percent of Canadian whisky exports.

The importance of the whisky industry to Canada extends beyond these production and export figures. Federal tax revenues from the sale of spirits have amounted to more than $600 million in each of the last six years.[17] Provincial mark-ups and sales taxes represent even larger sources of revenue, accounting for approximately $2 billion in 1989.[18] Canadian whisky accounted for roughly one-third of distilled spirits consumption in Canada in 1989. Hence, tax revenues generated from Canadian whisky sales are an important revenue source for the public sector. Yet, simultantously, this high tax environment is one important reason why Canada has become a less attractive home base for firms in the whisky industry.

An examination of the industry's evolution shows that past success does not guarantee future competitiveness. Significantly, Canada's largest participant in the industry, Seagram, has chosen to relocate its major activities to the U.S. to source competitive advantage south of the border, and there is a risk that others may follow.[19] These decisions are a result of the industry's inability to adjust competitively to global change, and in particular to shift from a concentration on production to one on marketing.

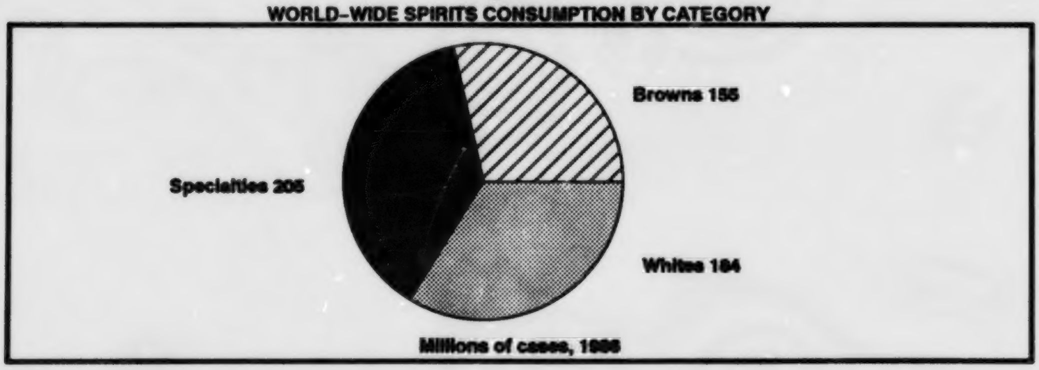
Seagram currently obtains advantage from its marketing department in the U.S. Various other Canadian competitors have been purchased by foreign multinationals with more extensive marketing skills and reach. These multinationals are intent on developing international brand portfolios and perform their most important activities elsewhere. As a result, while whisky retains its position as an internationally successful Canadian industry (based on a higher than average world export share and significant outbound direct investment), the reality is that Canada no longer provides a fertile environment within which to develop and sustain advantage.

A. Products and Processes

Whisky is distilled from a variety of raw materials, including corn, rye, barley, and malted barley. Canadian whisky is typically made almost completely from corn, with some rye added for flavour. After distillation, which now occurs in relatively large facilities, whiskies are aged in oak barrels, allowing the contents to react with the wood, with the air outside the barrel, and with other whiskies. Canadian whisky must be aged for a minimum of three years. The blending process is the most subtle part of whisky production, and all major brands of Canadian whisky are actually blends of several different whiskies. Each distillery uses explicit formulas to blend its whiskies, in order to achieve distinctive strength and flavour.[20]

Whiskies (browns) represent one category of distilled spirits, the others being whites (vodka, rum, gin) and specialties (brandy, liqueurs). Because of a growing consumer preference for lighter tasting spirits, world consumption of browns has steadily dwindled. In the period 1975 to 1986, consumption of whisky declined at an average annual rate of two percent. Demand for whites remained flat while consumption of specialty spirits increased at an annual rate of 13 percent.[21] Brown spirits now represent the smallest of the three categories (see Figure 4.5).

Figure 4.5
WORLD-WIDE SPIRITS CONSUMPTION BY CATEGORY

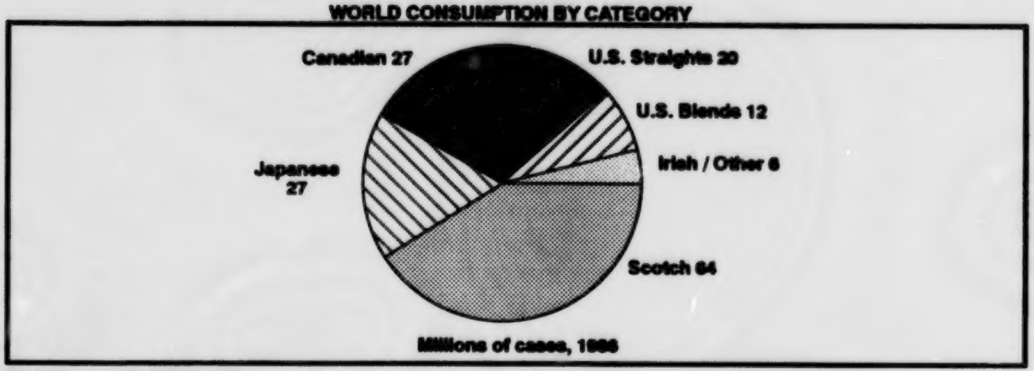


SOURCE: IMPACT DATABANK

Whiskies are categorized by country of production and include Scotch, Irish, Japanese, Straights and Blends (U.S.), and Canadian. Scotch continues to be the leading category overall, while Canadian and Japanese whiskies are tied for second (see Figure 4.6).

Figure 4.6

WORLD CONSUMPTION BY CATEGORY



SOURCE: IMPACT DATABANK

While most Japanese production is for domestic consumption, the majority of Scotch and Canadian whisky is produced for export. Regulations in each country restrict physical production of the respective category to that particular nation. National regulations also prescribe production methods and the raw materials that must be used.

B. Evolution of a Strong Canadian Industry

The whisky industry in Canada dates back to 1858, when an American grocer and grain merchant, Hiram Walker, moved to Windsor, Ontario, from Detroit, Michigan. Unsure about the future of American temperance laws, Walker built a small distilling village called Walkerville. From there he produced "Walker Club Whisky," the first major brand of whisky in Canada. Its introduction marked the first time whisky had been sold anywhere in the world as a branded product, and it quickly became a success. The name was later changed to "Canadian Club" when the U.S. Congress, in response to pressure from American manufacturers to restrict sales of Canadian products, passed a law requiring whisky labels to reveal the country of origin. Samuel Bronfman, another immigrant, set up a family-owned liquor mail order business prior to World War I. When the provincial governments took over the control and sale of liquor in the 1920s, Bronfman founded Distillers Corporation and built a distillery in LaSalle, Quebec, in order to supply the new provincial liquor boards from a central base.22

i) Early Advantages in Factor Conditions

Because production represented a large part of the overall cost of the product, Canada's abundant sources of cheap, high quality cereal grains, such as corn, rye, wheat and barley malt, gave the whisky industry a strong competitive advantage in the early days of the industry. Indeed, in the early years, it was only feasible to employ local grains in liquor production. This resulted in the development of small regional distilleries. Close links between the industry and Canadian agriculture were reinforced through significant sales of dried grains (the distilling process removed starch from the grain) as animal feed to farmers.

The accumulation and refinement of specialized skills played a significant role in the industry's development. The blending descriptions of individual regional distillers, which ultimately ensured consistency of flavour, were of particular importance. The blending process itself was difficult for new entrants to duplicate and over the years Canada's major firms, particularly Seagram and Hiram Walker, developed advanced skills in blending whiskies. Blending whiskies with a consistent taste was a very difficult process prior to the development of modern distilling techniques and is still regarded as a mixture of art and science. Seagram, in particular, has built up an impressive blending library.

Distillers in Canada also benefited from ample supplies of water that had various natural salts and minerals beneficial for whisky production. Natural waters aided the initial development of flavour at the mashing and fermentation stages. In addition, a broad range of yeast varieties, used as flavour producers and mixed with the grain mash, proved to be an important advantage.

Also central to the development of the whisky industry was Canada's proximity to the U.S., the world's largest whisky market. This proved crucial both during and after Prohibition.

ii) Small Domestic Demand

The industry benefited in the early days from high per capita consumption of whisky by Canadian consumers. The long, cold Canadian winters were conducive to whisky consumption. However, relatively early saturation of the small Canadian market induced local rivalry. This, combined with opportunities in the large U.S. market, spurred the Canadian industry's push into the U.S., a trend accelerated by Prohibition.

iii) Role of Chance

The Canadian industry, therefore, was well configured to benefit from the period of U.S. Prohibition. Lasting from 1919 to 1933, Prohibition gave Canadian distillers the opportunity to buy out the inventories of their American counterparts at low prices. It also fuelled a significant increase in sales of Canadian whiskies as smuggling into the U.S became widespread. Walker sold his company in 1926 because he had maintained his U.S. citizenship and felt compelled to comply with U.S. legislation. The Bronfmans, and the newly formed Hiram Walker- Gooderham and Worts, pursued various forms of expansion.

The Bronfmans, for example, acquired Joseph E. Seagram and Sons in 1928, a Canadian company established in 1857, thereby gaining control over the company's flagship V.O. brand of whisky. A new public company named Distillers Corporation-Seagrams Limited, was formed after the takeover. Distillers-Seagrams also entered into an agreement with the Distillers Company of the U.K., then the world's largest distiller. This gave Distillers-Seagrams marketing rights to various Scotch whisky brands. More importantly, both Hiram Walker and Distillers-Seagrams stockpiled their whiskies during the late 1920s, postponing immediate profit in anticipation of the repeal of Prohibition laws. Both firms later enjoyed significant advantages relative to American competitors when the 21st Amendment repealed Prohibition in 1933. They promptly reentered the American market with little competitive challenge from domestic whiskies. Large inventories of aged stock gave Canadian firms a substantial quality advantage over their American rivals for a number of years.

iv) Intense Rivalry and Acquisitive Strategies

The entrepreneurial spirit and rivalrous nature of the Canadian whisky industry continued after the end of Prohibition, as the leading companies aggressively pursued international expansion. Seagram, for example, purchased four more distilleries by the end of the 1930s: three in the United States and one in Scotland. Subsequent expansion occurred in Europe and South America throughout the 1950s and 1960s, and in Asia and Africa in the 1970s and 1980s.

Rivalry to acquire and control brands was particularly intense between Seagram and Hiram Walker, so that by 1980 Seagram's Crown Royal dominated the super premium segment (with 65 percent market share) and Hiram Walker's Canadian Club dominated the premium segment (with 50 percent market share).

Overall investment levels were high. Seagram entered into a joint venture with Kiri in Japan in 1977 and in 1978 acquired the single malt distillery of Glenlivet Distillers in Scotland. In 1988, Seagram acquired Martell as part of a strategy to export American and Canadian whiskies and import French Cognacs and Armagnacs and other products to North America.

C. The Deteriorating Canadian Diamond

i) Shifting Sources of Competitive Advantage

Competition in whisky is now largely based on the image of a brand and its price. Competitive advantage in the industry is heavily reliant on differentiation through marketing. Promotional activities such as packaging, advertising, and distribution have become the most important drivers of success in the industry. In each of these activities, however, Canadian whisky's success relies on operations that increasingly are located outside Canada. This has become particularly noticeable as the industry grapples with falling consumption patterns in North America, and an onerous tax regime in Canada.

ii) Declining North American Demand

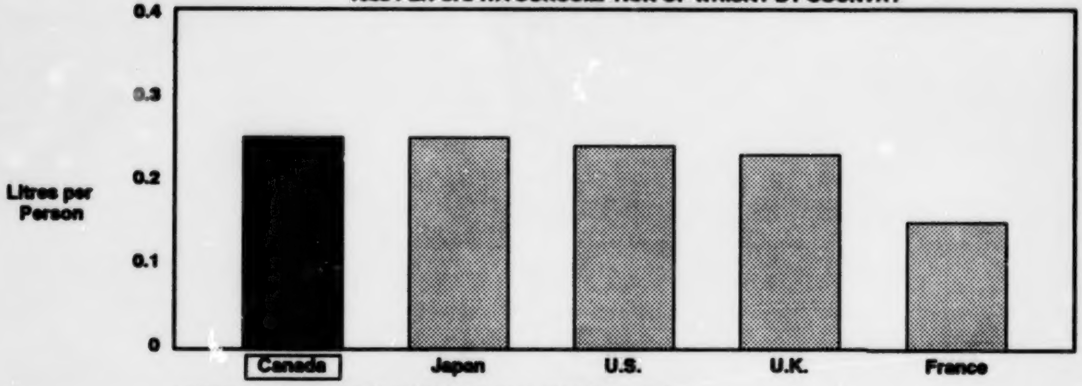
In the early days, the size and growth of the home market was an important factor in Canadian success in the whisky industry. Since Prohibition, Canadian whisky producers have had a home market consisting of both Canada and the Northern U.S. In fact, the sales and resulting recognition that Canadian whisky producers achieved during Prohibition were instrumental in establishing this cross-border "home" market.

Today, Canadian whisky producers perceive consumer tastes to be identical on both sides of the border, and distillers continue to be successful at marketing the same products in both nations. Although it does not represent a significant change in the industry's competitive environment, the Canada-United States Free Trade Agreement serves to reinforce this cross-border home market.[23]

Canadian whisky has benefited from high per capita consumption in Canada and a large North American home market since the early days of the industry (see Figure 4.7). The U.S. is by far the largest whisky market in the world, consuming about 60 million cases (each containing nine one-litre bottles) in 1988. This is approximately twice as large as Japan, the second largest market. But a number of factors are contributing to a decline in the size and growth of this market.

Figure 4.7

1988 PER CAPITA CONSUMPTION OF WHISKY BY COUNTRY



SOURCE: INTERNATIONAL TRADE STATISTICS, SEAGRAM ESTIMATES

The rising average age of the population in both the U.S. and Canada is associated with a decrease in per capita consumption of all alcoholic beverages.[24] In addition, health concerns and shifting social values have tempered consumers' demand for beverage alcohol. As noted, a simultaneous consumer preference for lighter tasting spirits has also prompted a shift away from whiskies toward whites and specialties. Consequently, both Canada and the U.S. have witnessed sharper declines in per capita consumption of whisky than in per capita consumption of total distilled spirits over the past several years.

Although the major firms are well represented in lights and specialties, this trend is of concern to Canadian whisky producers, as their category sales are heavily skewed toward the U.S. and Canadian markets. The Canadian market was particularly affected during the 1980s, due to relatively high taxation and mark-up levels.[25] Distillers have been able to partially offset this decline, however, by concentrating on improving their profitability in the United States.

It should be noted that in this industry a large home market is not a prerequisite for success. The U.K.'s share of world whisky exports is approximately 75 percent, with some 85 percent of U.K. output being exported.

iii) Declining Importance of Factor Conditions

Although factor conditions were significant in the early development of the Canadian industry, they are now of declining importance in an increasingly marketing-intensive industry. Most of the grain used today is corn, with rye (used primarily for the flavour it imparts to the final product) accounting for less than 5 percent of grain inputs. Basic grains are available on world commodity markets and represent only 5-10 percent of a whisky's cost. Conversely, packaging and marketing now account for approximately half of a distiller's costs. The shift to large scale, computerized distilleries has also reduced the impact individual distillers have in differentiating their product. Modern distilling techniques have become much more scientific.

iv)The Weakened Spirits Cluster

Related and supporting industries no longer provide competitive advantage to the whisky industry in Canada. Industry consulting and other market information services, such as Jobson's Liquor Handbook and Impact Databank and associated newsletters (M. Shanken Communications, for example) focus on the U.S. market and its suppliers.

Marketing expertise in distilled spirits is centred in the U.K. (attracted by the willingness of the industry to innovate) and in the U.S. (attracted by the size of the industry). In Canada, the declining spirits industry does not provide the same opportunity as in the U.S., nor does it enjoy the high profile of the industry in the U.K. Marketing expertise is therefore more difficult to attract. In addition, compared to U.S. offerings, Canadian advertising has not been particularly innovative. Often Canadian advertising agencies have taken the lead from U.S. parent companies. The regulatory prohibition of distilled spirits from using broadcast media has blunted innovation. Canadian whisky therefore relies heavily on the U.S. advertising industry, with the Canadian advertising industry serving only the declining Canadian market.

Although packaging is a critical component of differentiation, significant scale advantages can be obtained by Canadian producers from bottling in the United States. Most lower-end whiskies are bottled south of the border. However, considerations surrounding the cachet of "Bottled in Canada" have meant that most high-value products continue to be bottled in Canada.

Value-based taxation has also limited the volume of packaging done in Canada. While Seagram elected to market its Crown Royal brand in a bag-and-box in the U.S., it did not do so in Canada because taxation, unlike in the U.S., is calculated on the value of the packaging in addition to the beverage.

Finally, government-controlled distribution in Canada limits specialized skill development in point-of-sale promotion. For example, the Liquor Control Board of Ontario (LCBO) is the largest purchaser of liquor in Canada. All spirits sold in Ontario must be purchased by consumers or licensees directly through the LCBO, which in turn purchases directly from domestic manufacturers or import agents. Point-of-sale promotion was permitted only as recently as five years ago in LCBO outlets. This control of distribution and promotion was particularly harmful to smaller distillers, who had less opportunity to develop distribution skills and capabilities. They were instead forced to rely increasingly on large foreign partners to access export markets. By contrast, Seagram has developed distribution expertise through one of the strongest networks of worldwide affiliates, because it has employed a successful strategy of foreign acquisitions and joint ventures.[26] The cumulative effect of these factors is that Canadian whisky producers are relying increasingly on foreign operations and industries to obtain advantage.

v) Counterproductive Government Policy

Early government regulation helped to lay the foundation for the Canadian whisky brand name, through the appellation of Canadian whisky itself: "Canadian Whisky shall be distilled in Canada, and shall possess the aroma, taste and character generally attributed to Canadian whisky."[27] In recent decades, however, government policy has become much more intrusive and has negatively affected the international competitiveness of the Canadian whisky industry, particularly the industry's ability to develop strong marketing activities.

As discussed earlier, high domestic taxes on liquor sales have reduced consumption levels and lowered margins for distillers. The result has been a decrease in the importance of the Canadian market within the cross-border home market for Canadian whisky. Marketing regulations, such as the prohibition of in-store merchandising prior to 1985, combined with provincial mark-ups based on total product value, have hampered Canadian efforts in these areas. Government-controlled distribution has impeded firms from developing techniques necessary to compete in other markets, while separating the Canadian distilling industry from related fields. By damaging the home market, government policies have prevented distillers from innovating to exploit opportunities in other markets. This has made the Canadian diamond less attractive as a home base for internationally competitive distillers.

The strict nature of Canadian distribution and retailing regulations has separated the Canadian distilling industry from other related industries. Government control over distribution has restricted Canadian distillers from entering retailing and wholesaling, and from developing specialized skills in these areas. In contrast, U.K. distillers are integrated into distribution, with firms holding major chains of liquor retail outlets. This has also enabled U.K. distillers to achieve synergies between beer and spirits operations, as both product lines are sold through the same company-controlled distribution channels. In Canada, distribution channels are government-controlled, with beer and spirits entering different channels depending on the regulations of each province. The end result is that unlike the U.K., Canada does not have a well developed cluster of competitive industries. Regulations have actually prevented such a cluster from developing.

vi) Increasing Levels of Foreign Ownership

The Canadian whisky industry has recently undergone a prolonged period of consolidation that has reduced levels of domestic rivalry. Seagram, the leader in Canadian whisky sales worldwide, is the only significant participant in the Canadian industry that is Canadian controlled (52 percent). Other competitors are owned by large foreign companies. Hiram Walker is now part of Hiram Walker-Allied Vintners, the wine and spirits division of Allied Lyons of the U.K. Hiram Walker-Allied Vinters also has a 52 percent stake in Corby, another Canadian distillery. Canadian Mist Distilleries, makers of the largest selling brand of Canadian whisky worldwide, is owned by Brown Forman of the United States. Other Canadian competitors are Alberta Distillers, owned by American Brands (Jim Beam) of the U.S.; Gilbey Canada, owned by Grand Metropolitan (International Distillers and Vintners) of the U.K.; and Schenley Canada, owned by Guinness (United Distillers) of the United Kingdom.

The combination of high foreign ownership with an unattractive industry diamond may result in a further exodus of home base activities from Canada. This will make the upgrading process within the industry more difficult. Foreign firms have effectively acquired intangible brand value and market share in the Canadian market, rather than access to strength from the local determinants.

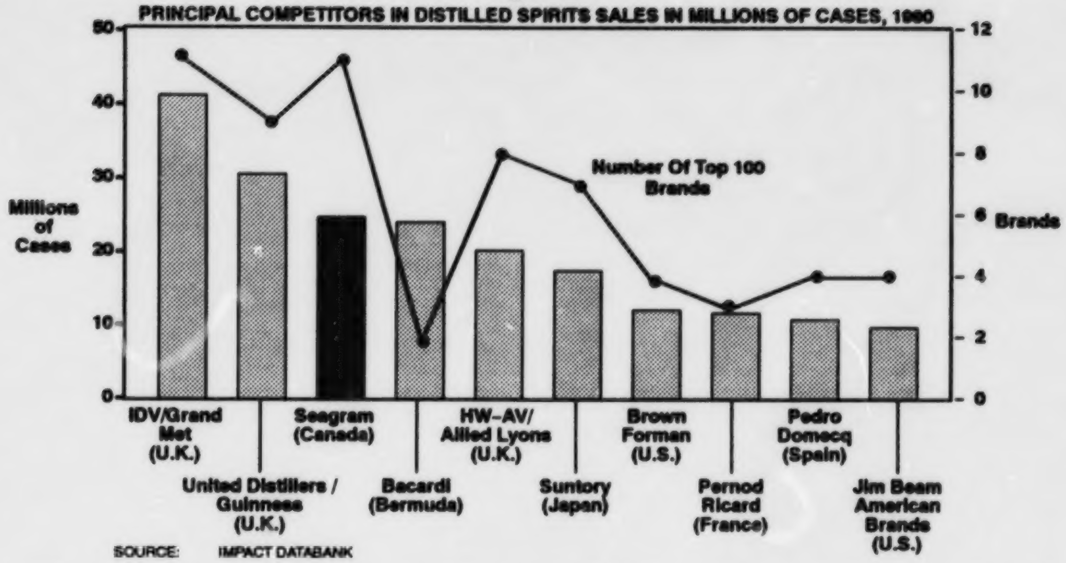
vii) Unrelated Diversification by Canadian Distillers

An increasingly unattractive Canadian market, together with restrictions on the development of distribution channels, have encouraged Canadian firms to diversify into unrelated fields, rather than strengthen or build the distribution capabilities for their core businesses. In 1980, Seagram sold its interests in Texas Pacific, an oil and gas company, and attempted to acquire a controlling interest in Conoco. Conoco was acquired by Du Pont in 1981, with Seagram tendering its Conoco shares to Du Pont in exchange for a 20 percent interest in the chemical company's common shares. Seagram currently has a 24 percent stake in Du Pont, which produces about half of the firm's pre-interest operating income.[28]

Hiram Walker merged with Consumer's Gas Company in 1979, a move that led to the deterioration of the firm's financial stability. When Gulf Canada acquired shares in Hiram Walker in 1986, it was forced to sell its spirits operations to Allied Lyons of the U.K. Thus, Seagram was left as the only significant Canadian-owned competitor in the worldwide distilled spirits industry (see Figure 4.8).

Figure 4.8

PRINCIPAL COMPETITORS IN DISTILLED SPIRITS SALES IN MILLIONS OF CASES, 1990



SOURCE: IMPACT DATABANK

The process of consolidation was an industry-wide phenomenon throughout the 1980s. An example is IDV's 1987 purchase of Heublein, designed to reinforce IDV's North American presence. In Canada, large-scale consolidation has occurred for two reasons. First, the growing importance of extensive distribution networks outside Canada and large advertising campaigns has posed near-insurmountable competitive difficulties for small firms. Second, while the system of provincial government-controlled distribution guarantees distribution to smaller distillers domestically, it inhibits them from developing the skills and networks necessary to distribute in other markets.

These factors have heightened the dependency of many Canadian whisky companies on large multinationals in order to maintain competitiveness. The result has been a shift in the focus of rivalry, from the family-firm rivalry that historically characterized the Canadian industry to rivalry between multinationals. With this shift, rivalry is thus increasingly focused on activities that occur outside of Canada, rendering Canada a less attractive location for home base activities.

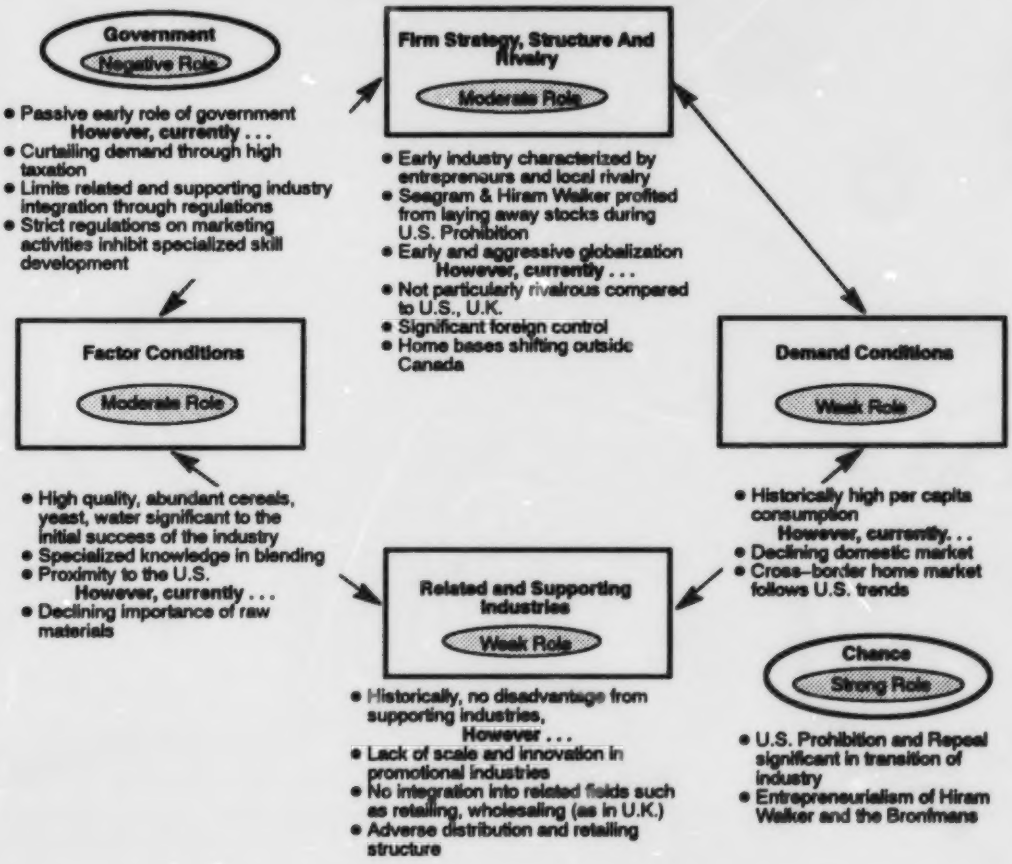
viii) Shifting Home Bases

Brand management now increasingly occurs outside of Canada. Canadian operations are entrusted with production only (production in Canada being necessary in order to comply with Canadian regulatory requirements). For example, Canadian Mist is responsible for the production of its Canadian whiskies, while Brown Forman runs packaging and marketing in the United States. One exception is the Canadian division of Hiram Walker-Allied Vintners, which is entrusted with the international brand management of Canadian Club, the only brand over which the Canadian division maintains such rights.

These developments mean that the activities most important in the whisky industry are moving to foreign home bases. Even Seagram, the major domestically controlled competitor, locates the majority of its activities outside of Canada (less than five percent of total company assets are currently Canadian). The home base of Seagram's Canadian whisky business has already moved to the United States. Today, Hiram Walker is the only significant competitor with a truly Canadian home base.

Figure 4.9

DETERMINANTS OF NATIONAL COMPETITIVE ADVANTAGE – WHISKY INDUSTRY


Government
Negative Role
• Passive early role of government
However, currently . . .
• Curtailing demand through high taxation
• Limits related and supporting industry integration through regulations
• Strict regulations on marketing activities inhibit specialized skill development
Firm Strategy, Structure And rivalry
Moderate Role
• Early industry characterized by entreprenours and local rivalry
• Seagram & Hiram Walker profited from laying away stocks during U.S. Prohibition
• Early and aggressive globalization
However, currently . . .
• Not particularly rivalrous compared to U.S., U.K.
• Significant foreign control
• Home bases shifting outside Canada
Factor Conditions
Moderate Role
• High quality, abundant cereals, yeast, water significant to the initial success of the industry
• Specialized knowledge in blending
• Proximity to the U.S.
However, currently . . .
• Declining importance of raw materials
Demand Conditions
Weak Role
• Historically high per capita consumption
However, currently. . .
• Declining domestic market
• Cross–border home market follows U.S. trends
Related and Supporting Industries
Weak Role
• Historically, no disadvantage from supporting industries,
However . . .
• Lack of scale and innovation in promotional industries
• No integration into related fields such as retailing, wholesaling (as in U.K.)
• Adverse distribution and retailing structure
Chance
Strong Role
• U.S. Prohibition and Repeal significant in transition of industry
• Entrepreneurialism of Hiram Walker and the Bronfmans

D. Summary

Whisky represents a traditionally competitive Canadian industry in which Canada is today losing its competitive advantage. The industry developed in Canada due to favourable factor conditions, high per capita domestic demand, intense initial local rivalry between family-based firms and close proximity to the U.S. market. The Canadian industry was, therefore, well positioned to seize the benefits that flowed from U.S. Prohibition and to develop large international competitors within Canada.

As the sources of competitive advantage have shifted from production to promotion, Canada has provided a less fertile environment for innovation, and the continued success of the industry is now in doubt. This shifting basis of advantage has exposed weaknesses in the Canadian diamond, particularly in the areas of demand conditions and related and supporting industries. In particular, the lack of marketing and distribution expertise in Canada is a critical issue.

More and more participants in the industry source marketing and distribution advantage from outside Canada. Canadian firms have been acquired by foreign producers in order to broaden brand portfolios and access the Canadian market, and Canadian operations have devolved to essentially bulk production. Seagram, the one remaining Canadian-owned firm, has transferred its home base to the United States. This loss of home-base activities and domestic rivalry is a serious blow to the competitiveness of the Canadian industry. In fact, Canadian regulations requiring the category to be a "product of Canada" are today the main force keeping production in Canada.

The whisky case study is particularly instructive as it shows that competitive advantage in an industry is not static. Although the Canadian diamond was well configured for the industry's early success, it has failed to adapt well to the terms of competition in the modern industry.

4. THE GEOPHYSICAL CONTRACTING INDUSTRY

One of Canada's successful service industries, geophysical contracting provides a clear example of the mutual benefits that flow from advantages in several points of the diamond. Specialized factor conditions, large and sophisticated domestic demand, strong related and supporting industries and intense local rivalry -- all linked to beneficial government involvement -- are present in this small but highly innovative Canadian industry. Examining this industry is particularly instructive because Canada has either invented or significantly advanced many of the key technologies in the field, and Canadian equipment manufacturers are world leaders in applying these technologies. Understanding the conditions that have supported this innovativeness, which contrasts with the situation in many of Canada's export industries, offers important lessons for how the economy could upgrade.

Geophysical contracting is a technology-intensive industry dependent on advanced skill and knowledge creation. It utilizes electrical, magnetic, radiometric, seismic and gravity methods to collect and compile data on the composition of the earth. These techniques are employed in petroleum, minerals, environmental, engineering, geothermal, groundwater and oceanographic studies.

Canadians are the recognized world leaders in the application of geophysical techniques to mineral exploration and development. Canadian airborne survey companies have 70 percent of the world market; Canadian geophysical equipment manufacturers, software developers and data interpretation companies each constitute approximately 60 percent of their respective world markets.[29] Canada makes up a significant proportion (14 percent) of all expenditures on mineral exploration surveys in this small worldwide industry (approximately U.S. $36.6 million).[30] Ninety-six percent of worldwide expenditures on geophysical surveys are in petroleum applications, in which the U.S. dominates.[31]

A. Products and Processes

Geophysical surveying companies use various methods to collect and compile data, which is then processed and analyzed to produce maps and develop exploration targets. Most geophysical surveying for petroleum exploration is done with seismics. This industry profile focuses on technology developed in mining geophysics and its applications to other areas, such as the geotechnical (which includes engineering) and environmental fields. The main techniques used in mining geophysics are electromagnetics (EM), magnetics, resistivity, and induced polarization (IP). EM techniques are used to detect conductive ore bodies for mining exploration. They are also used in environmental/ groundwater studies and to a lesser extent in mapping. Magnetic techniques detect the differing magnetic properties of rock formations and assist in geological mapping programs. Resistivity, which permits subsurface mapping of materials of differing conductivities, is used in engineering applications and is useful for determining the presence of water in arid countries. IP is a technique used to detect disseminated ore sulphide bodies that may not show up using EM equipment.

The geophysical contracting industry can be divided into ground and airborne segments. Canadian firms are especially dominant in export markets in airborne contracting, reflecting distinctive Canadian demand conditions. Since airborne techniques are more capital and technology-intensive than ground survey work, this segment is still performed in other countries largely by foreign service providers rather than locally trained people operating foreign equipment. Techniques used in airborne surveying include airborne electromagnetics (AEM), aeromagnetics and airborne radiometrics. AEM is used mainly in exploration to find conductive base metal deposits; aeromagnetics is used in mining and geological mapping (70 percent) and in petroleum applications (30 percent). Radiometrics, originally developed for uranium exploration, is mainly used to detect radioactive deposits and for geological mapping.

B. Industry History

Prior to World War II, Canada gained technological expertise in mining geophysics through the emigration of talented scientists and individuals from countries such as Sweden, Finland, Germany and England. Canada provided ideal conditions to test new techniques because of its mineral-rich land mass obscured by glacial overburden and sedimentary deposits.

In the late 1800s, Thomas Edison made the first ore body discovery in Canada using a magnetometer. Sherwin Kelly, who had trained in France, introduced self-potential and resistivity methods to Canada in the 1920s. Subsequently, EM methods were applied by Hans Lundberg, who brought Swedish developments to Canada. Meanwhile, Lachlan Gilchrist of the University of Toronto and David Keys of McGill University were developing these technologies in the academic realm. Similar technology was simultaneously being advanced in other parts of the world, particularly in Scandinavia.

Canada moved to the forefront of the major advances in geophysics after World War II. With the exception of IP, developed in the late 1940s by a team under the supervision of Arthur Brant (that included Canadians Harold Seigel and Leonard Collett), the most critical developments were mainly in airborne techniques. Airborne surveys were a major breakthrough because they made it possible to cover vast unexplored areas at relatively low cost -- a key consideration for the Canadian mining industry. The two main airborne techniques developed were AEM and aeromagnetic.

AEM developments in Canada were spearheaded by immigrants, and largely financed by multinational mining companies. The industry developed because of the sophisticated home demand from these mining companies and their active role in geophysical R&D. Hans Lundberg built the first airborne electromagnetic system in 1946, and conducted the first AEM survey over Ontario and Quebec. The airborne EM industry in Canada began in 1949, when six engineers commissioned by the mining company Stanmac formed McPhar Geophysics. McPhar subsequently gained financial backing from Inco to produce the world's first operational airborne EM system.

In 1953, the Finnish engineer Vaino Ronka produced an AEM system for the English Hunting Group, operating in Canada as Aeromagnetic Surveys. Other mining companies -- AMAX, Rio Tinto, Texas Gulf Sulphur, and Sherritt Gordon Mines -- developed their own AEM systems. From 1954 to 1970, three groups, often working through joint ventures -- Inco-McPhar, Hunting Survey Group and Amax-McPhar -- made 20 base metal discoveries, 80 percent of all finds.[32]

The history of the airborne magnetometer followed a different course, due to the involvement of the federal government through the Geological Survey of Canada (GSC). The GSC had avoided AEM technology because the mining industry resisted government involvement in exploration activity. The first airborne magnetometer, patented by Gulf Oil, had been developed in the U.S. during World War II to detect German submarines. In 1946, Canadian Norman Keevil conducted the first airborne magnetic survey in Ontario, demonstrating the use of airborne surveying for industry. The GSC then bought a magnetometer from the U.S., designed a control box to allow calibration of fields, and began to fly test surveys to demonstrate its use for geological mapping. In the 1950s, Finland initiated a program of systematic surveys using both airborne magnetic and EM methods. In the 1960s, the GSC contracted out aeromagnetic surveys to Canadian firms, thereby supporting the infant industry and eventually mapping 75 percent of Canada. In the 1970s, the GSC developed the aeromagnetic gradiometer and promoted its use and improvement among industry participants. These breakthroughs helped make Canada the dominant competitor in airborne geophysical surveying.

The value of geophysics to the mining industry is reflected in the number of new mines discovered using these techniques. Since 1948, all of the increases in Canada's zinc, lead and uranium production, 90 percent of the increase in silver, 75 percent of the increase in nickel and 65 percent of the increase in copper production have been from mines discovered using geophysics.[33]

C. Sources of Competitive Advantage of the Canadian Industry

Demand conditions were instrumental in spurring the development of geophysical surveying in Canada. A growing demand for base metals prompted multinational mining companies operating in Canada to encourage and finance the development of geophysical equipment. Companies such as Inco, AMAX and Selco were important to early breakthroughs. Mining companies commissioned engineers and geophysicists to build new equipment, thereby enhancing Canada's lead in technology. Harold Seigel of Scintrex and Tony Barringer of Barringer Research, who formed two of the major firms in the geophysical industry, were both active participants in the mining industry. Several of the geophysical companies sprang up as service arms of mining companies, for example, the airborne survey companies Aerodat, Dighem, and Questor.

The airborne portion of the industry evolved in a tumultuous way, with companies undergoing several changes in ownership and structure through periods of consolidation and fragmentation. The case of what is now Intera Kenting is an illustrative example. Canadian Aeroservice, established in Ottawa and doing predominantly government work, was formerly owned by the U.S. company Aeroservice. As the firm started to grow, Tom O'Malley broke off and formed Geoterrex, another successful airborne company. Aeroservice was then purchased by Litton Industries in the United States. Since CIDA contracts had Canadian content requirements, Litton formed the first public airborne survey company, Spartan Aero. Spartan was later bought out by Trimac, a trucking company, which also owned Kenting, a drilling company. These two were merged together to form Kenting Earth Sciences. Finally, Intera bought Kenting Earth Sciences to form its airborne geophysical division called Intera Kenting. Intera then purchased United States. Aeroservice, completing a full circle in the history of its ownership.

Canadian geophysical firms had technical know-how and entrepreneurial commitment, but required financing. Initially this was achieved through U.S. ownership. Later, major Canadian airborne companies such as Geoterrex and Questor were bought by foreign companies, CGG (France) and World Geoscience (Australia), respectively. However, despite the various changes in ownership, the companies retained their Canadian home bases and Canadian character in terms of people and technology, while reaping the benefits of stronger financing and networking through larger foreign parents. The firms remained small and intensely rivalrous, which created pressures that promoted further advances in technology. Home bases remained located in Canada because of the superior Canadian diamond in the geophysical contracting industry. Thus the industry provides an example of where home base and ownership do not necessarily coincide.

I) Advanced Factor Conditions

Canada's geography, climate, and resources provided a challenging testing ground for geophysics. For example, in the mid-1800s, Toronto was chosen as a site for a magnetic observatory by the famous mathematician Carl Friedrich Gauss. The University of Toronto later became the home of mining geophysics. Lachlan Gilchrist, realizing the potential to use geophysics in mineral exploration, began to teach undergraduates to apply physics to mineral exploration. Several talented scientists who would significantly advance the industry worked under Gilchrist, including Norman Keevil and Arthur Brant.

Gilchrist's successor, J. Tuzo Wilson, helped the University of Toronto achieve prominence through his pioneering work in pure geophysics. In the early stages of the industry, research in universities was funded primarily by government. However, by the late 1970s and early 1980s, two-thirds of geophysical university research was industry-funded. The creation of Lamontagne Geophysics as a direct result of research undertaken at the University of Toronto is a good example of advanced factor-creating mechanisms spawning new entrants. Canadian postsecondary programs were regarded as the best in the world, and drew numerous foreign applicants.

The geophysical contracting industry is one of the few industries studied where specialized advanced factors, rather than inherited basic factors, was decisive in producing a competitive Canadian industry. The scholarly work done at the University of Toronto and the well-trained and motivated students educated there spurred the creation of a host of competitive firms. These firms then became world technology leaders.

II) Impact of Firm Strategy

The Canadian geophysical contracting industry has successfully become international, with exports of equipment and services accounting for approximately 60-70 percent of sales. The international strategy of airborne survey companies has been driven in part by their sensitivity to the cyclical nature of the domestic mining industry. The mining industry is subject to price swings in commodity markets, which in turn affect the exploration budgets of mining companies and thus their demand for geophysical contract services. For this reason, and also because of restrictions related to seasonal weather conditions, the Canadian industry increased its outward orientation in the 1960s. Canadian technology spread abroad, and Canadian contractors were actively involved in new markets. Aerodata in Australia, for example, was founded by an Australian trained by the subsidiary of Canadian firm Scintrex and partly financed by the Canadian firm McPhar.

Initially, Canadians conducted all aspects of the surveys, including data procurement, analysis and presentation for other countries. In the case of ground geophysics, as the equipment improved and became more user-friendly, foreign countries bought equipment from Canada and often used Canadian-trained local people to carry out the surveys. Airborne surveying is more capital-intensive and requires a more sophisticated user. Nevertheless, Canadian companies have sold airborne surveying equipment to sophisticated users such as the Japanese, Germans, Brazilians, Chinese and Indians, all of whom fly their own surveys. Dighem, for example, sold a helicopter system to the Japanese as well as to the German government, which carries out surveys in developing countries.

iii) The Role of Domestic Rivalry

Intense domestic rivalry has forced Canadian firms continually to innovate resulting in sustained Canadian technological leadership. New firms are frequently formed as ambitious individuals from leading companies break away to form their own businesses. Many of the principals of the smaller instrument companies were at one time employees of either Scintrex, Barringer or Exploranium. In addition, many attended the same schools and are part of a close-knit community. Within that community, there is a high degree of professional rivalry. The actual number of geophysical companies peaked in the 1970s and has since decreased. However, considering the small size of the industry, firm concentration is still low. The rivalry in this industry is a curious and highly successful mixture of fierce competition for market share, and a close knit community whose members are connected through academia or previous employment and a common intellectual commitment to geophysics.

Declining worldwide expenditures on airborne geophysical surveys have led firms in that industry to devote up to 25 percent of revenues to R&D in a bid to improve products and gain market share. Low profit margins, vigorous rivalry and the cyclical nature of demand have all contributed to a high employee turnover rate of up to 20 percent per year. Despite these conditions, firms have a strong commitment to the industry due to the high degree of psychological commitment of owners and employees. The same intense rivalry and commitment to the industry are also present in related and supporting industries. Healthy rivalry in the geophysical contracting industry -- and in those that relate to it -- has helped to create a dynamic environment in which firms have been forced to innovate constantly.

iv) The Growing Canadian Cluster

Successful geophysical companies are clustered in the Toronto and Ottawa regions -- in Toronto because of its proximity to the mining industry and the presence of the University of Toronto, and in Ottawa because of government contracts through the GSC and overseas projects funded by aid organizations such as CIDA. The high concentration of firms in these two areas helped to create the intense rivalry and innovative behaviour that are the defining characteristics of the industry. The original players in the industry were McPhar, Sharpe Instrument (the predecessor to Scintrex) and Barringer, all initially involved in both equipment manufacturing and surveying.

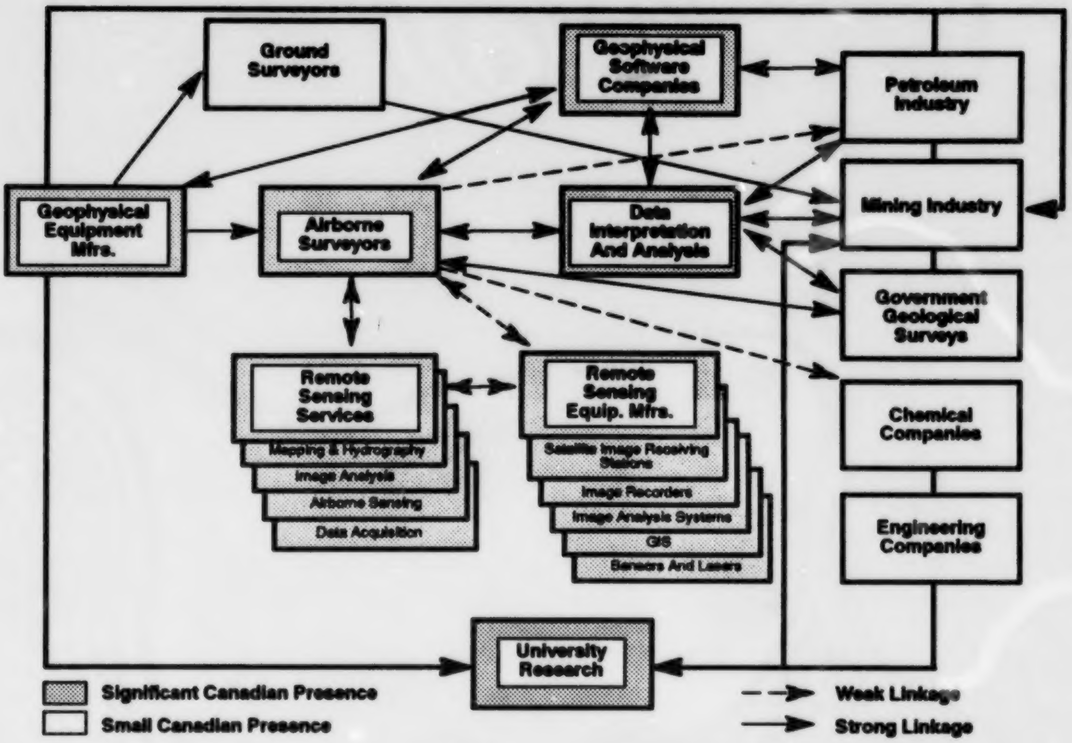
Canadian geophysical equipment manufacturers have captured approximately 70 percent of the $50 million world market in mining geophysical equipment, and exports account for 60 percent of their sales. There are 32 major firms, each with an average of 20 employees; only Scintrex, with 150 employees, has significantly more. These firms spend a large proportion of their revenues (10–20 percent) on R&D. The annual publication "Trends in Mineral Development," by Dr. Peter Hood of the GSC, documents the new or upgraded products developed by these companies. Equipment manufacturers offer a high level of service that further promotes export markets. Scintrex, for example, has equipped and trained the Geological Surveys of China and India to conduct their own surveys. The Canadian geophysical equipment industry is both innovative and highly competitive.

By providing a market beyond Canada for geophysical equipment, software and data interpretation services, the internationally focused strategies of survey companies have encouraged the broadening and deepening of the cluster of related and supporting industries. Successful survey companies operating overseas created a pull-through mechanism for other Canadian companies, which also became highly export-oriented. Other industries that form part of this cluster include remote sensing services and equipment manufacturers, as well as university research.

Indeed, the geophysical contracting industry is one of the few Canadian industries in which a significant cluster has been formed. Early geophysical work was carried out in-house within mining companies. They were averse to maintaining a permanent staff, however, because of the cyclical nature of exploration and were not willing to pay for expensive R&D. Several survey companies arose that developed and manufactured their own equipment, and conducted all the tasks necessary for a survey. Subsequently, specialized firms devoted solely to equipment manufacturing emerged, further enhancing the sophistication of equipment used in the field. Several airborne surveying companies continued to assemble their own equipment, using parts produced by these specialized equipment manufacturers. Four out of the nine airborne survey companies manufacture their own equipment, three of which also develop their own proprietary software.[34]

As the industry grew more sophisticated with the acquisition of digital data and the proliferation of computers, data interpretation companies and data plotting companies arose. Such firms often used Canadian-developed technology, such as shadow mapping software, and were able to perform special types of analysis not conducted by survey firms.[35] There are now approximately 25 consulting firms, the largest being Paterson, Grant and Watson Ltd. with 18 employees and 50 percent of the international market. Their clients are mainly in the petroleum and mining industries, as well as aid agencies and foreign governments. Geophysical data interpretation companies arose from the sophisticated needs of the geophysical contracting industry, and have complemented the improvement in survey data and equipment (see Figure 4.10).

Figure 4.10
SUCCESSFUL RELATED AND SUPPORTING INDUSTRIES


Ground Surveyors
Geophysical Software Companies
Petroleum Industry
Geophysical Equipment Mfrs.
Airborne Surveyors
Data Interpretation And Analysis
Mining Industry
Government Geological Surveys
Remote Sensing Services
Mapping & Hydrography
Image Analysis
Airborne Sensing
Data Acquisition
Remote Sensing Equip. Mfrs.
Satellite Image Receiving Stations
Image Recorders
Image Analysis Systems
GIS
Sensors And Lasers
Chemical Companies
Engineering Companies
University Research
Significant Canadian Presence
Small Canadian Presence
Weak Linkage
Strong Linkage

Since the late 1970s, Canadian geophysical software developers specializing in mining geophysics have gained approximately a 50 percent share of the $2 million international market.[36] High quality software is crucial to the interpretation of survey data. Canadian firms face strong U.S. competitors, who have the advantage of proximity to the large U.S. petroleum industry. However, mining geophysics and seismic surveying in petroleum exploration differ in their trends in computer usage. While seismic surveying has seen a growing use of capital-intensive supercomputers, mining geophysics has seen an increase in the use of PCs that are now able to perform complex calculations at faster speeds. Canada possesses the most successful firm in this area, Geosoft, which is the leader in the sophisticated Australian market.

The new and growing field of remote sensing, including the acquisition of natural resource information using imagery from aircraft or satellite, is a related field that could have benefits for the geophysical industry. Canada has approximately 15 percent of the world market in remote sensing. Development of this field in Canada was initiated by the federal government in 1972 with the creation of the Canada Centre for Remote Sensing, which gives industry access to its research results. There are 120 remote sensing firms in Canada, with the large players MDA and Intera aggressively operating in export markets. For example, Intera bought out its only competitor in the United States. Smaller Canadian firms also regularly win competitive international bids and are aggressive exporters. Links with the geophysical industry are also being established. For example, Intera of Calgary has an airborne geophysical arm at Intera Kenting in Ottawa.

D. Government's Role in Upgrading

The federal government, primarily through the GSC, has had a beneficial effect in promoting competitive rivalry, innovation, and continued upgrading in the geophysical industry through its policies of contracting out to industry and disseminating research results among the firms. The GSC was instrumental in commercializing the airborne magnetometer by obtaining a license for the patent from Gulf Oil. It demonstrated potential applications of the magnetometer, improved on calibration facilities, and encouraged industry to participate through contracts. The GSC also developed the gradiometer in-house and convinced industry of its benefits through test surveys. In the late 1960s, and again in the 1970s in response to the oil shortage, the GSC along with Atomic Energy of Canada Limited initiated the application of geophysical techniques to uranium exploration. The expertise developed paved the way for Canadian companies to obtain major contracts in Iran.

At one time, government contracts constituted 50 percent of aeromagnetic airborne work, which provided an essential source of business for an emerging industry. The governments of Ontario and Quebec also bought regional AEM surveys. Government was a demanding buyer and had stringent specifications, which were important to early innovation in aeromagnetic surveys. Even the U.S. Geological Survey used Canadian specifications in drawing up contracts.

The GSC's policy has been to promote the domestic geophysical contracting industry by conducting its own research and by participating in technology transfer with industry and other research institutions such as universities. Between 1974 and 1984, the federal government contributed $16.5 million to technology transfer in geophysical projects, approximately 25 percent of the geophysical expenditures in that period.[37] The Department of External Affairs and International Trade's Program for Export Market Development (PEMD) helps to finance visits abroad to promote Canadian technology as well as client visits to Canada to see Canadian technology. The GSC itself offers a pool of highly qualified individuals active in geophysics research. In fact, more researchers in this field in Canada are employed by government than by universities.

E. Threats to Canada's Position

Until now, Canada has been the recognized world leader in mining geophysics. Canada has had an attractive diamond in the geophysical contracting industry, with all elements of the diamond playing a strong role. Looking ahead, however, a number of issues that could affect the industry's future prospects deserve attention.

First, shrinking domestic demand in the mining industry has had a negative impact on the geophysical contracting industry. Demand conditions are important in fostering an environment in which new innovations are created and adopted. In a constrained environment, mining companies have become reluctant to invest in geophysical equipment that has not already been proven. Although the world mining industry experienced a downturn in the 1980s, Australian mining companies continued to demand geophysical services and thus aided the development of their domestic industry. Canadian mining companies were unwilling to support its high cost, yet Anglo-American bought the advanced Prospect AEM system for use in South Africa. This may mean that the Canadian geophysical industry is losing some of its position as a fertile domestic testing ground for innovations.

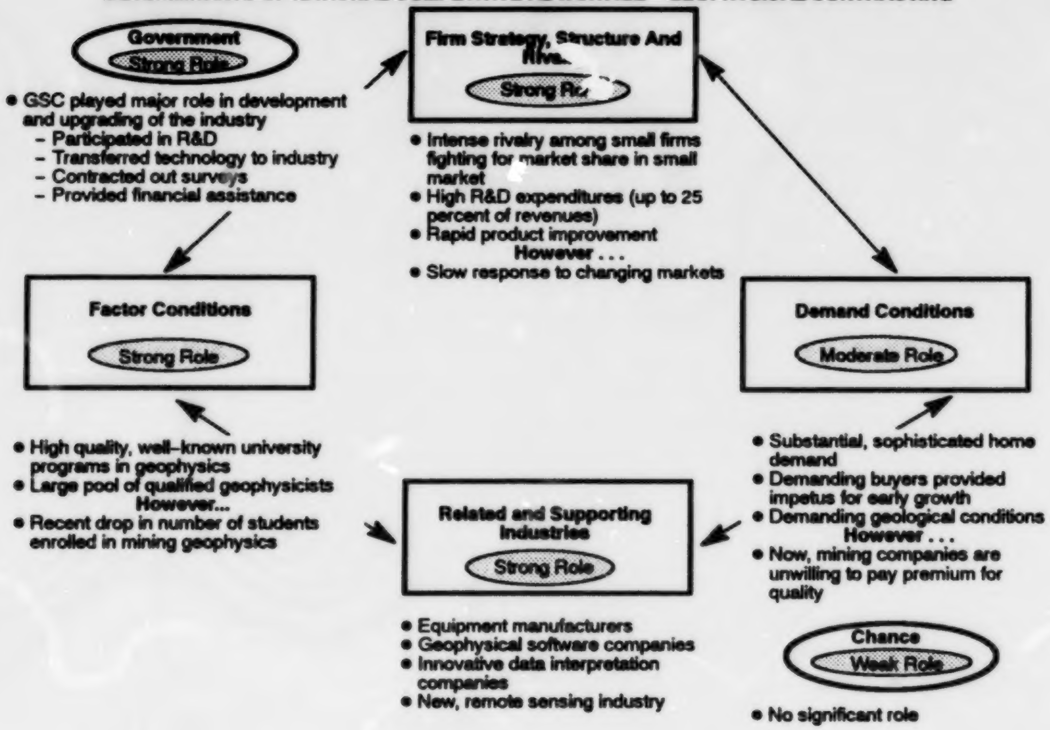
Second, Canada faces many challenges with respect to its rich base of advanced human and knowledge resources. Enrollment in university geophysics programs has been decreasing. Average class sizes in the University of Toronto geophysics program have dropped by 30 percent in the last decade. In addition, some foreign companies are obtaining ownership of technology developed in Canadian universities. For example, a Japanese firm, Oyo, bought the rights to radar interpretation and seismic technology developed at the University of Waterloo and Queen's University.[38] A more encouraging sign is the expanding program at Waterloo, which offers specialization in geotechnical and environmental applications of geophysics. This program expanded from 23 students in 1988 to about 40 students in 1989. Professors are internationally known consultants, and cooperative research with industry is promoted.

Third, as export markets are steadily gaining in importance, Canadian firms are facing a growing disadvantage when compared to foreign firms whose governments play an active role in marketing and liaison with buyer governments. Since government and aid agency contracts in this industry represent an increasing proportion of all contracts in export markets, this disadvantage will become more acute. But it is important to recognize that such captive markets can dull the competitive edge of foreign competitors, while encouraging innovation among the export-reliant Canadian firms.

Finally, foreign firms are adapting to new market conditions better than many Canadian firms. Faced with shrinking demand from the mining industry, geophysical firms are applying mining geophysical techniques to other areas including geotechnical (including engineering), environmental and petroleum. Oyo is a major competitor in geotechnical applications and is aggressively acquiring interests in foreign firms, such as the equipment manufacturing arm of BRGM in France. Furthermore, countries such as Australia, which had to adapt existing technology to their own unique and difficult environment (in which the high degree of salinity in the soil was a major impediment), have been extremely innovative and may soon be able to challenge Canada's traditionally strong competitive position.

Figure 4.11

DETERMINANTS OF NATIONAL COMPETITIVE ADVANTAGE - GEOPHYSICAL CONTRACTING



Government

Strong Role

- GSC played major role in development and upgrading of the industry
  - Participated in R&D
  - Transferred technology to industry
  - Contracted out surveys
  - Provided financial assistance

Firm Strategy, Structure And Rivalry

Strong Role

- Intense rivalry among small firms fighting for market share in small market
- High R&D expenditures (up to 25 percent of revenues)
- Rapid product improvement

However . . .

- Slow response to changing markets

Factor Conditions

Strong Role

- High quality, well-known university programs in geophysics
- Large pool of qualified geophysicists

However...

- Recent drop in number of students enrolled in mining geophysics

Demand Conditions

Moderate Role

- Substantial, sophisticated home demand
- Demanding buyers provided impetus for early growth
- Demanding geological conditions

However . . .

- Now, mining companies are unwilling to pay premium for quality

Related and Supporting Industries

Strong Role

- Equipment manufacturers
- Geophysical software companies
- Innovative data interpretation companies
- New, remote sensing industry

Chance

Weak Role

- No significant role

F. Summary

Because of vigorous rivalry among Canadian firms -- an attribute that has been reinforced by the other elements of the diamond -- the geophysical surveying industry is somewhat of an anomaly among the 25 industries we studied. Intense rivalry has been fed by strong advanced factor conditions. Together with sophisticated demand from multinational mining companies, Canada has boasted the leading geophysics programs and highly qualified scientists and engineers drawn by the country's superior natural resources. The government also played a critical role in promoting rivalry and innovation through out-sourcing and technology transfer, especially in the area of aeromagnetics. These mutually reinforcing advantages are the major reasons for the strength of the Canadian diamond.

As was the case with Northern Telecom and the central office switch industry, the geophysical surveying firms first met sophisticated Canadian domestic demand. The small size of the Canadian market then forced them to seek export markets. Success in those markets fed the development of a broad and deep cluster of related and supporting industries within Canada, including competitive and innovative geophysical equipment manufacturers, sophisticated geophysical software developers, advanced data interpretation companies, and the new remote sensing industry. The geophysical survey companies are also a highly competitive group, fighting for a share of the shrinking market by rapidly innovating to differentiate their products.

The Canadian diamond has provided an attractive home base for geophysical contractors, and Canada is still considered the world leader in the industry. However, there are threats to Canada's position, including the drop in enrollment in university geophysics programs, the decline in the level -- and possibly the sophistication -- of demand in Canada, and aggressive competition from Australian and Japanese firms. Nevertheless, the high level of domestic rivalry, the presence of strong related and supporting industries, and the availability of many advanced factors within Canada should all help the industry to overcome these threats.

A major lesson to be drawn from this case study is that even with an exceptionally strong home diamond, an industry must maintain its dynamism and continually upgrade or lose out to foreign competition.

CHAPTER 5

OVERVIEW OF THE CANADIAN INDUSTRY STUDIES

The industry studies summarized in the previous chapter provide useful insights into the sources of advantage in Canadian industry, and demonstrate the application of the theory outlined in Chapter 3 in the Canadian context. In this chapter, we summarize the patterns that emerged in all 25 of the industries we studied, supplemented by our briefer examination of dozens of others. This provides an overall perspective on the Canadian economy that will be elaborated upon in the next several chapters.

What emerges is an internally consistent set of attitudes and behaviours in industry, labour, and government -- which we term the old economic order -- that has dominated much of the economy. The threats to this old order, and the impediments to moving away from it, represent the central challenges to the Canadian economy.

1. PATTERNS IN THE INDUSTRY STUDIES

The 25 industries examined in detail accounted for 37 percent of all Canadian exports in 1989. Although it is not possible to provide full summaries of all the studies here, Figure 5.1 summarizes our assessment of the effect of the different parts of the diamond upon the competitive advantage of each industry studied.

The resource-based industries studied included electricity, newsprint, market pulp, aluminum, Atlantic fish, styrene, nickel, beef processing and manufactured housing. In these industries, competitive advantage is drawn primarily from basic factor conditions. Other elements of the diamond, with few exceptions, were not significant in creating advantage in these industries. Of special note is the lack of world-class related and supporting industries. These findings were consistent with, and confirmed the results of, the statistical analysis and the cluster charts presented in Chapter 2. Of these industries, nickel was a notable exception. The nickel industry, with its emphasis on applied R&D and close links with advanced educational institutions, has succeeded in developing advantages in advanced factors.

The market access-based industries we studied included auto assembly, auto parts, and pulp and paper equipment. It was difficult to find Canadian-specific sources of advantage in any of these industries.

Only in Canada's innovation-driven industries do we see Canadian firms drawing advantage from favourable conditions in several parts of the diamond, and thereby reaping the benefits of a mutually reinforcing system. These industries include, among others, geophysical contracting, central office switches, consulting engineering, ice skates and life insurance. Not surprisingly, analysis of these industries indicates that competing on the basis of innovation appears to work best when there are advantages in several determinants. The roles of advanced factor creation, sophisticated domestic demand, and firm strategy, structure, and rivalry were far more pronounced in this set of industries than in the others. Human biologicals and whisky were included in this category because they were innovation-driven in the past; however, the strength of their industry diamonds has eroded.

Figure 5.1

SOURCES OF INTERNATIONAL COMPETITIVENESS IN SELECTED CANADIAN INDUSTRIES

INDUSTRY	FACTOR CONDITIONS	DEMAND CONDITIONS	RELATED AND SUPPORTING	STRATEGY, STRUCTURE & RIVALRY	ROLE OF GOVERN-MENT	ROLE OF CHANCE	% SHARE OF WORLD EXPORTS 1989
RESOURCE-BASED							
Newsprint	(B) High	Low	Low	Low	Low	-	60
Market Pulp	(B) High	Low	Low	Low	Low	-	33
Nickel	(B & A) High	Low	Moderate	Moderate	High	-	60
Aluminum	(B) High	Low	Low	Low	Moderate	High	18
Atlantic Groundfish	(B) High	Low	Moderate	Low	Negative	-	8
Styrene	(B) High	Moderate	Moderate	Low	Low	-	18
Electricity	(B) High	Moderate	High	Moderate	High	-	15
Beef Processing	(B) Moderate	Moderate	Low	Low	Moderate	-	1
Manufactured Housing	(B) High	Moderate	Low	Low	Moderate	-	5
MARKET-ACCESS BASED							
Auto Parts	Low	Low	Low	Low	High	-	10
Auto Assembly	Low	Low	Low	Low	High	-	10
Pulp & Paper Equipment	Low	Low	Moderate	Low	Low	-	11
INNOVATION-DRIVEN							
Ice Skates	(A) Moderate	High	High	High	Low	-	50
Urban Rail	(A) Moderate	Moderate	Moderate	Low	Moderate	Moderate	7
Flight Simulators	(A) Moderate	Low	Low	Moderate	Low	-	22
Industrial Explosives	(B) Moderate	High	Moderate	Moderate	High	-	n/a
Commuter Aircraft	(A) Moderate	Moderate	Moderate	Low	Moderate	Moderate	10
Central Office Switches	(A) High	High	Moderate	High	Moderate	Moderate	15
Geophysical Contracting	(A) High	Moderate	High	High	High	-	50
Consulting Engineering	(A) Moderate	High	Low	High	High	-	n/a
Whisky	(B&A) Moderate	Low	Low	Moderate	Negative	High	12
Life Insurance	(A) Moderate	Moderate	Low	High	High	-	10
Human Biologicals	(A) Moderate	Low	Low	Low	Moderate	Moderate	n/a
OTHER							
Waste Management	(A) Moderate	Moderate	Low	Low	Low	Moderate	n/a
Radiation Therapy Equipment	(A) Moderate	Low	High	Low	High	-	30

(A) Advantage stems from advanced factor conditions
(B) Advantage stems from basic factor conditions

Other industries included waste management and radiation therapy equipment, and illustrate the difficulties faced when advantages in industry diamonds are limited. These are examples of industries that have drawn moderate strength from a variety of determinants but typically have relatively weak overall industry diamonds.

2. MODES OF COMPETITION IN CANADIAN INDUSTRY

Our industry studies exposed some characteristic patterns of behaviour in Canadian industry. Historically, there has been little pressure for Canadian firms to upgrade or expand their sources of advantage beyond basic factor advantages, or preferred access to the home market. Canadian firms have often adopted inward-looking, cost-based strategies. The size or sophistication of Canadian domestic demand has proven to be a spur to innovation, and an advantage, in only a few of the industries studied. Weak related and supporting industries have reinforced a narrow cost orientation. Limited domestic rivalry, coupled with historic protection, has reduced the incentives for many Canadian firms to innovate and improve their performance relative to other international competitors. Canadian government policy, though well-intentioned and helpful in some industries, has historically tended to foster reliance on basic factors and dependency on government and has insulated the economy from external pressures.

A. Advantages in Basic Factors

Many of the industries studied reveal a significant dependence on basic factor conditions as the prime advantage, and an inability to create the advanced or specialized factors necessary for long-term competitive success in international markets. Basic factors include natural resources such as trees, fish, and cheap and abundant hydroelectricity. Market pulp, newsprint and Atlantic fish processing are examples of industries that have been overly dependent on favourable basic factor endowments for their international competitive success.

Evidence from the industry studies suggests that many of Canada's resource-based industries have failed or been slow to upgrade or widen their sources of advantage. Historically, relatively cheap factor inputs allowed Canadian firms to earn high profits by supplying unprocessed or semi-processed goods. The Atlantic fish processing industry's competitive position, for example, is based almost entirely on the availability of inexpensive fish stocks. The industry's core advantage is vulnerable to the depletion of resources -- recently reflected in reduced total allowable catch quotas -- and to the availability of lower-cost substitute fish species harvested by competitors in other waters.

Reliance on basic factor advantages makes industries vulnerable. A good example is the Canadian beef processing industry. The industry developed as a result of favourable basic factor conditions including land and climate suitable for rearing high-quality cattle. However, as labour costs have escalated in Canada, this industry now faces higher labour costs than U.S.-based competitors. When combined with smaller scale processing facilities, the industry has difficulty competing with American rivals. Similarly, the competitive position of Quebec's aluminum smelting industry is largely dependent on the continued availability of plentiful and inexpensive hydroelectric power. Cheap electricity has been a significant driver of past competitive success, with about three-quarters of the industry's output being exported in primary form (aluminum ingots) for further processing, primarily to the United States.

Since Canadian firms have enjoyed low resource cost positions vis-à-vis rivals in other nations, they have been able to meet world prices without investing in the latest process technology, upgrading to higher value products, investing in skills development and human resources, or utilizing labour efficiently. For example, Canada's favourable position in styrene production results from a strong competitive position in the petrochemical feedstocks ethylene and benzene. However, both Dow and Nova have relatively old facilities.

Evidence of a lack of upgrading in the pulp industry is reflected in its relatively low labour productivity and high maintenance costs compared to international rivals. The average number of hours worked per air dried metric tonne (ADMT) of pulp produced in the B.C. costal industry is almost twice that in Finland. Overall labour costs in the industry reflect this disparity. In 1989, total labour costs per ADMT of pulp were $114 in the B.C. coastal industry, $96 in the B.C. interior, and $79 in Eastern Canada. Comparable figures for competing pulp-producing countries were $81 in Sweden, $68 in the U.S. South, and $49 in Finland.[1] In 1989, the Canadian pulp industry also averaged 21 days lost to maintenance work per mill versus 13 days in both the U.S. and Scandinavia.[2]

Nickel represents one notable exception to this pattern. Here competitive pressures have fostered significant upgrading in a number of areas. Faced with intense price competition in international commodity markets in the 1980s -- about 95 percent of Canada's production is exported -- industry leaders such as Inco and Falconbridge responded aggressively by rationalizing their operations and upgrading their process technologies. Productivity and efficiency were improved through techniques such as bulk mining, for example. The industry compensated for high relative wage rates by investing in sophisticated and highly productive technologies. We observed a similar pattern of upgrading in Canada's ice skate industry. When faced with the challenge of low-cost producers from the Far East and Eastern Europe, the industry increased its level of automation to offset high labour costs. It also innovated to differentiate new products and to maintain its high-quality position in competing in higher price segments. Such positive responses have been rare, however, for reasons we will explore in subsequent chapters.

B. Risk-Averse, Inward-Looking, Cost-Based Strategies

An orientation toward basic factor advantages has led Canadian-based firms in many of the industries studied to follow cost-based strategies premised on static views of cost, rather than investing in new technologies in order to improve their cost position. This has been particularly apparent in industries such as the Atlantic fishery where government intervention has impeded capacity rationalization and an overhaul of the industry's structure.

A notable exception to static cost-based thinking is once again the nickel industry, where advanced process technology has been developed and deployed. Vertical retreat mining, a Canadian innovation, has represented ground-breaking advances in drilling and explosives technology, as well as progress in the development of more efficient muckers, crushers, and material handling equipment.

In non-resource-based industries, historically high tariff barriers resulted in many firms relying almost exclusively on the Canadian market for large portions of their product line. At the same time, firms have been prone to proliferate products and diversify widely to take greater advantage of the protected and profitable Canadian market.

As noted in Chapter 2, the companies that have exported have done so primarily to the United States. Close to three-quarters of Canada's exports have historically been destined for the U.S., and exports not destined for the U.S. have been predominantly non-manufactured goods. Thus, many firms have not reaped the benefits of keen attention to international developments in technology and markets, nor have they had the incentive to improve productivity or produce more sophisticated products as a result of world-class competition or serving the world's most demanding buyers.

Some industries -- mainly in the resource sector -- have provided examples of more global strategies, though often still relying on factor costs. A partial exception is aluminum smelting, in which some firms (notably Alcan) have forward-integrated into more sophisticated consumer and industrial goods, though much of the production is done in the U.S. and elsewhere. Significantly, aluminum and nickel are the resource-based industries in which Canadian participants have the most global outlook.

In other industries, outward-looking strategies have often arisen as a result of limited or saturated domestic demand. Canadian life insurers have a significant export orientation with as much as 40 percent of revenues derived from foreign operations. CAE Electronics, the world leader in flight simulators, is one of few examples of an aggressive competitor with an outward-oriented, differentiation-based strategy.

C. Lack of Intense Canadian Rivalry

In many industries studied, Canada has lacked intense domestic rivalry. This further blunts pressures for upgrading. As we discuss in detail in Chapter 9, weak rivalry in the domestic market reflects the existence of historically weak competition regulations, an historically protected market and high concentration in many industries.

In some industries, firms have often worked cooperatively with one another in R&D ventures and have shared technology rather than strived for innovation leadership. For example, pulp and paper companies in Canada have not considered technology to be an important source of advantage and have been quite willing to share technological developments.

In fact, domestic rivalry contributed little to the competitive advantage of the industries we studied. Even where there were multiple rivals, a culture and context that deemphasized competition often limited rivalry and slowed the rate of innovation. For example, although Canada has two manufacturers of urban mass transit equipment, provincial procurement policies result in little direct competition between UTDC and Bombardier. In human biological products, Connaught Laboratories has effectively dominated the Canadian market for years.

The exceptions were found among Canada's most innovative industries. In the industries studied where innovation and upgrading have been significant, rivalry was intense. Firms have had managers or owners who have been internationally oriented, sought excellence in their field, and have followed strategies that have reinforced these characteristics. For instance, both CCM/Sport Maska and Canstar have the strategic goal of being the dominant world supplier of hockey skates and constantly incorporate leading-edge technology to this end. These strategic pursuits have resulted in fierce rivalry, which in turn has stimulated innovation and upgrading.

Two other examples of rivalrous industries are the life insurance and consulting engineering industries. With financial deregulation, rivalry in the life insurance industry, which is already extensive due to the presence of over 160 companies in the Canadian market, is likely to become even more intense. In consulting engineering, numerous firms compete, reflecting the strength of domestic demand conditions, although two of the largest competitors, SNC and Lavalin, recently merged.

Northern Telecom is sometimes cited to illustrate that domestic rivalry is unnecessary in Canada. In fact, the Northern Telecom case proves the rule, as discussed in Chapter 4. Given government intervention around the world, there has been effectively no domestic rivalry in any nation, including the United States. Northern Telecom, with some direct and indirect local competition, was an exception. At the same time, Canadian policies which created several private telecommunications service providers have led to demand side pressure to innovate which is almost unique to Canada.

D. Limited Advanced and Specialized Factor Creation

Without the impetus to innovate and upgrade, Canada has developed few advanced factors or institutions for specialized factor creation. For example, Canada's largest export industry has only one research centre -- The Pulp and Paper Research Institute of Canada (Paprican). Other countries have been more successful in fostering R&D in new pulp and paper technologies.

Canada generally does not demand, invest in, create, or adopt the most advanced technology. In the radiation therapy equipment industry, for example, firms continue to rely on older cobalt equipment rather than on newer linear accelerator technology. Nor does Canada appear to place a sufficiently high value on technical training and expertise, with skills shortages appearing in advanced manufacturing industries such as aircraft, urban mass transit and automobile assembly, as well as other applied engineering service industries.

This pattern can also be seen in the low levels of R&D investment in many Canadian industries relative to foreign competitors, and in the existence of relatively few specialized technical programs at universities and community colleges. In the pulp and paper sector, U.S. and Swedish firms invest approximately one percent of sales in R&D while the figure in Japan and Finland is about 0.8 percent. In 1988, Canadian R&D expenditures in this industry represented only 0.3 percent of sales.[3]

Again, the exceptions to this pattern are found in a number of Canada's innovation-driven industries. Here advanced and specialized factor creation has taken place, with encouraging results. Canstar, the leading competitor in the ice skate industry, has developed state-of-the-art blade and boot technologies through a consistent focus on R&D; the company now spends between two and three percent of sales on R&D. Canada's CAE Electronics, which has sold the largest installed base of commercial flight simulators in the world, has built up its own technological skills base over the past 30 years at its facility in Montreal. With R&D expenditure levels of over 20 percent of sales, CAE has institutionalized in-house advanced and specialized factor creation to ensure technologically advanced and reliable simulators.

Factor creation is particularly effective when multiple institutions and firms operate in close geographic proximity. The nickel industry has benefited from the clustering of firm activity, including educational institutions such as Laurentian University, Cambrian College and the Haileybury School of Mines, and the Ontario government's Ministry of Northern Development and Mines in the Sudbury area. For example, Inco has forged a partnership with Cambrian College that combines on-the-job training with academic studies. Overall, the industry is unusually well supported by R&D associations such as HDRK (Hard Rock Mining Research), the Nickel Development Institute and CANMET (the Canada Centre for Mineral and Energy Technology), as well as by professional and industry associations.

Several firms in the consulting engineering industry have also enhanced their human resource capabilities through skills training programs on internally developed computer-aided drafting and design (CADD) systems. This has supported a record of innovation. Other examples can be found in the urban mass transit and central office switch industries. Canadian firms in these industries have invested in R&D, taken advantage of specialized engineering programs, and worked with governments and universities to create advanced and specialized factors.

E. Lack of Cutting-Edge Demand

Domestic demand conditions in many of the industries studied have rarely been unusually sophisticated or anticipatory. Buyers have generally provided little pressure for firms to upgrade their sources of advantage and have often reinforced factor dependence. In fact, an overall lack of leading-edge demand likely helps to explain the mix of Canada's most competitive industries -- industries in which sophisticated demand is generally less critical to success. Some Canadian industries have managed to take advantage of the size and sophistication of the U.S. market partially to compensate for this but their ability to sustain advantage is often tenuous. For example, Canadian producers have, on occasion, been able to test and introduce products in the U.S. prior to releasing them in Canada.

Characteristics of Canadian companies as competitors have, in turn, diminished their attractiveness as buyers. Since many Canadian firms have not been at the forefront in either creating or adopting world-class technologies, they have tended not to be overly sophisticated buyers. The automotive parts sector in Canada, for example, has been heavily impacted by the traditional build-to-blueprint behaviour of its principal customers, the Big Three American original equipment manufacturers. A traditional emphasis on lowest price as the most important purchase criterion, combined with short duration supply agreements, has provided little incentive for parts manufacturers to invest in increasing their technological capabilities.

We found several examples of Canadian companies locating product trials or launch customers outside the domestic market. CAE sold its first flight digital simulator to Swiss Air, having lost a prospective order from Air Canada. The launch customer for the Canadair 50-seat Regional Jet is the German commuter airline DLT, not a Canadian carrier.

Similarly, in industries such as pulp and paper equipment and mining surveying equipment, Canadian producers have often found it easier to sell applications of new technology abroad because Canadian buyers tend to want proven, existing technology. Manufacturers of waste management and pollution control equipment have found that Canada's lack of demanding environmental standards lessened the pressures on customer industries to examine and upgrade their production processes. This, in turn, reinforces the types of company strategies referred to earlier.

There are exceptions to Canada's general lack of sophisticated and demanding buyers. In the manufactured housing industry, for example, energy projects in the arctic conditions of Canada's north led to the development of highly energy efficient manufactured buildings, including the R2000 system. Canada was therefore well positioned to take advantage of export markets when the development of energy resources in the Middle East in the 1970s provided significant demand for these well-insulated products. Canadians are also perceived as being among the most demanding buyers of log homes in the world, and this helps explain why Canadian firms account for half of the log home imports into Japan. Another example of beneficial domestic demand can be found in the life insurance industry: Canadians hold the third highest national per capita amount of life insurance coverage in the world, and Canadian firms have been innovative in the industry.

Challenging mining conditions in parts of the country have meant that Canada has remained at the forefront in satisfying the sophisticated requirements of the industrial explosives industry. The consulting engineering industry evolved in order to service large government-funded infrastructure projects commissioned to overcome the hardships of climate, scale and physical terrain. Consulting engineering has been a strong supporting industry for the electrical power generation industry, particularly through its leading expertise in design and construction management for large-scale hydroelectric plants.

Finally, there is at least one industry in which Canada can claim to have the most critically demanding customers of all -- ice skates. Canada is also the largest single market, accounting for half of world demand.

A few industries that historically derived advantage from Canadian buyers, such as commuter aircraft, geophysical contracting and central office switches, are currently faced with an erosion of this advantage. In geophysical contracting, other nations' mining companies are beginning to take the lead in trial and adoption of innovative products, as we saw in our case studies in Chapter 4. Similarly, in central office switches it is the U.S. Regional Bell Operating Companies that are becoming the most demanding buyers of equipment.

Sophisticated demand by itself rarely compensates for weakness in other determinants. While Canadians have the fifth highest average per capita consumption of beef, and arguably lead the U.S. in the trend towards the consumption of leaner cuts of beef, disadvantages in firm size, a relative lack of rivalry, and weaknesses in related and supporting industries have had a greater and offsetting influence on the industry's overall competitive position. Similarly, competitive advantage derived from the demand for short takeoff and landing (STOL) aircraft to operate in the Canadian bush underpinned de Havilland's success prior to its entry into the commercial commuter aircraft market. However, it has been unable to sustain advantage in the commuter segment as a result of a weak industry diamond overall.

F. Weaknesses in Related and Supporting Industries

Weaknesses in related and supporting industries both reflect and contribute to the other attributes of Canadian industry described earlier. Our analysis suggested that few Canadian industries derive significant competitive advantage from world-class related or supporting industries in Canada. These industries are underdeveloped either because leading firms have chosen to vertically integrate -- as in the case of flight simulators -- or because supply inputs are sourced from abroad, most notably from the United States.

Examples of the latter among our industry studies include commuter aircraft (fuel management systems are currently sourced from two companies in the U.S. and one in the U.K.), urban rail (Canada has no presence in the electric motors industry, a critical component in replacement vehicles), as well as Atlantic groundfish, market pulp and automotive assembly industries where important machinery is sourced abroad.

The automotive assembly sector derives little advantage from supporting industries: for example, the cost position of Canadian steel producers is generally inferior to that of their competitors in the United States. Resin manufacturers have not developed specialized automotive expertise, and the tool and die sector has not grown with the automotive sector. Another example is the beef processing industry where Canada has little international presence in supporting industries such as spices, fillers, processing equipment and packing equipment.

The newsprint and whisky industry case studies in Chapter 4 demonstrated that it is not just the subsidiaries of foreign companies that source from outside Canada. This is both a cause and a result of Canada's lack of a vibrant machinery and equipment sector, an issue identified in Chapter 2 and reinforced by our industry studies. Even in relatively successful equipment industries such as custom-engineered products for electrical power generation, many key inputs are imported into Canada, and the home base activities of many foreign subsidiaries are performed outside of Canada.

The lack of related and supporting industries reflects the buyer behaviour of Canadian companies, the absence of specialized skills and technology so important in machinery and sophisticated components and services, and limited new business formation in manufacturing. Without related and supporting industries, we in turn observe less overall investment in specialized factors.

Related and supporting industries provide advantage to only a few of the industries studied. For example, geophysical contractors and consulting engineers (offering engineering procurement and construction management services) have enhanced the position of mining companies, while software developers and equipment manufacturers have helped geophysical contractors. Successful transit system design consulting, reflecting sophisticated demand within Canada from transit commissions, has also proven to be an important supporting industry for vehicle manufacturers, particularly in the preparation of foreign equipment and system bids.

G. The Role of Government

Governments at the federal and provincial levels, despite good intentions, have often had a detrimental overall effect on Canada's competitiveness. Historically, governments in Canada have adopted a paternalistic outlook in their management of the economy. Government has been a protector, an agent of development and a generous provider of goods and benefits. Yet all these things can slow the rate of upgrading in industry.

Traditionally, considerable effort was directed at insulating the economy from external pressures. This was done by protecting firms from international competition through such mechanisms as high tariffs, and by attempting to safeguard national autonomy through policy initiatives such as the National Energy Program. The auto industry (both parts and assembly) is a particularly prominent industry whose development has been significantly affected by government trade policy in the form of the Auto Pact, and whose overall diamond is not particularly strong.

Government transfers and social welfare programs, as well as direct interventions in the economy through mechanisms such as subsidies, have further increased the economy's dependence on government.

A number of Canada's successful export industries have been strongly affected by government action. Yet these have often been industries in which governments (not only Canadian governments) intervene heavily through financial support in order to help win foreign orders, rather than create conditions that would spur innovation. For example, urban mass transit equipment contracts have been highly dependent on soft government financing arrangements. Similarly, Boeing de Havilland's commuter aircraft sales have been supported by loan and guarantee assistance; in fact, the federal government now has a small fleet of repossessed aircraft, as a result of the shaky financial condition of many regional airlines.[4]

Of all the industries studied, Atlantic groundfish probably represents the most extreme case of government influence on the competitiveness of an industry -- in this case for the worse. Virtually all aspects of the fisheries industry are affected by government regulations, including the provision of company quotas (which have historically favoured the smaller, less efficient in-shore fleet), approval requirements for efficiency increasing on-board equipment and many other measures. Federal and provincial governments have been motivated strongly by employment considerations, which has meant lagging efficiency in the processing sector versus other nations (this was also the case in parts of the beef processing industry). In fact, the structure of unemployment benefits has actually created disincentives to working beyond ten weeks in many regions, at times creating temporary employment shortages in the industry.

Governments have tended to respond to, and reinforce, company strategies and modes of behaviour, although they have played a positive role in fostering upgrading in some industries. While government procurement has often tended to slow innovation, it had a positive impact in two of the industries we studied. As we saw in Chapter 4, governments have been the source of early and sophisticated demand in the geophysical contracting industry; in Quebec, the outsourcing policies of institutions such as Hydro-Quebec have proven to be a spur to Quebec-based consulting engineering firms.

Similarly stringent but sound financial regulations and good cooperation between government and industry participants have also helped to create a strong life insurance industry in Canada. Finally, Canada's tough safety regulations for explosives have helped to create an internationally competitive industry.

H. Importance of Chance Events

Without a history of healthy Canadian diamonds, the development of several of the most successful industries studied has been strongly influenced by chance events. For example, the Canadian aluminum, whisky and central office switches industries were strongly impacted over time by chance events driven by regulatory decrees in the United States.

Alcan was initially a subsidiary of Alcoa. The break up of Alcoa in 1928 through a U.S. Supreme Court ruling enabled Alcan to start independent operations. The terms of the divestiture ruling were such that they granted Alcan rights to the world market, excluding the United States. While Alcan's present strength as a global competitor is attributable to decisive actions undertaken since the court decision, this initial chance event had a positive impact on the development of Alcan's international orientation.

Prohibition in the U.S. played an important role in the emergence of the Canadian Whisky industry. Canada was in a unique position to supply liquor to the U.S. and gain a better understanding of U.S. consumers.

Although the ongoing success of Bell-Northern Research has been driven by research excellence, its creation was in large part due to the 1956 court ruling in the U.S. that required Western Electric to license its technology and to sell its minority share in Northern Telecom to Bell. Interestingly, another U.S. antitrust action in the 1970s facilitated NT's successful move into the U.S. as the second supplier to the Regional Bell Operating Companies.

Such examples of regulatory changes in the U.S. should suggest to Canadian firms the importance of keeping abreast of salient regulatory as well as other relevant developments in the U.S. so that they are able to react appropriately.

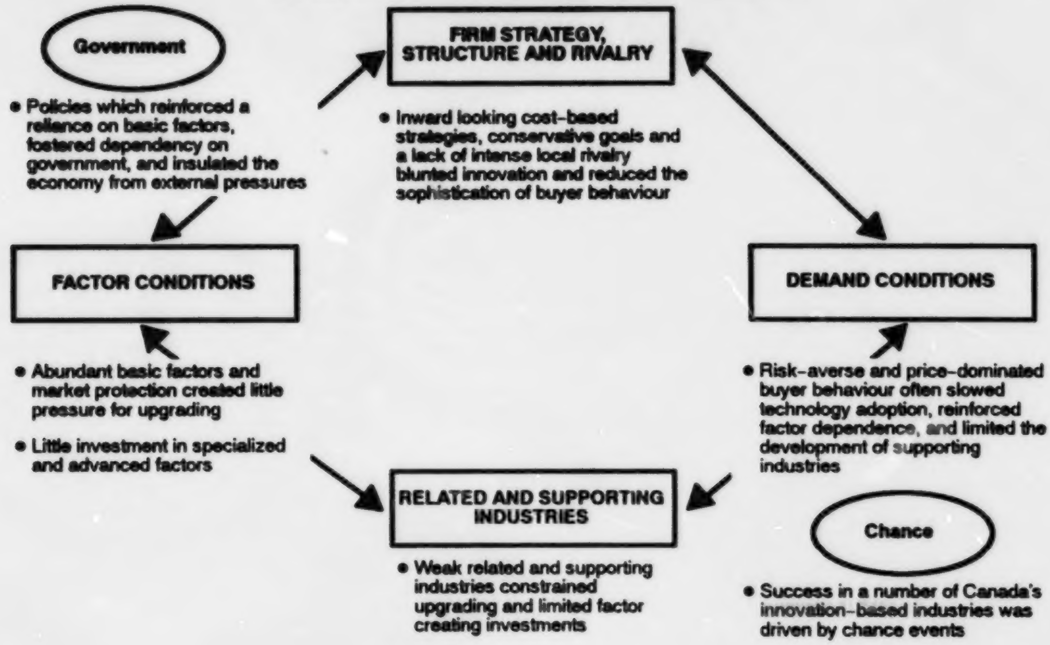
Chance events have been significant in other Canadian industries as well. Canada's role as an aircraft assembly site during World War II spurred the postwar development of that industry. Major environmental catastrophes, such as the 1979 Mississauga train derailment and the PCB warehouse fire at Saint-Basile-le-Grande in 1988, have provided impetus to environmental control industries, particularly in the transportation of hazardous waste and the incineration of PCB wastes.

The number and importance of Canadian industries that have been influenced by chance events is a cause for concern. In a nation that has relatively few world-class industries that are not natural resource-based, the fact that success has been so strongly affected by chance events is disquieting.

3. THE OLD ECONOMIC ORDER

The patterns that we find in the industry studies are reflections of a distinctly Canadian economic system. All aspects of this old economic order are interrelated and internally consistent (see Figure 5.2). Reliance on basic factors has led to limited factor creation. Firm strategies and government policies have tended to reinforce this reliance, limit the sophistication of Canadian demand, and reduce the degree of rivalry in the domestic market. This in turn has hindered the development of world-class related and supporting industries. Only by understanding the nature of this old economic order can we explain Canada's past economic success and assess its future prospects.

Figure 5.2
THE OLD ECONOMIC ORDER: COMFORTABLE INSULARITY


Government
FIRM STRATEGY, STRUCTURE AND RIVALRY
FACTOR CONDITIONS
DEMAND CONDITIONS
RELATED AND SUPPORTING INDUSTRIES
Chance

- Policies which reinforced a reliance on basic factors, fostered dependency on government, and insulated the economy from external pressures
- Inward looking cost-based strategies, conservative goals and a lack of intense local rivalry blunted innovation and reduced the sophistication of buyer behaviour
- Abundant basic factors and market protection created little pressure for upgrading
- Little investment in specialized and advanced factors
- Risk-averse and price-dominated buyer behaviour often slowed technology adoption, reinforced factor dependence, and limited the development of supporting industries
- Weak related and supporting industries constrained upgrading and limited factor creating investments
- Success in a number of Canada's innovation-based industries was driven by chance events

The picture of the Canadian economy that emerges from the industry studies -- which will be described more fully in the following chapters -- is one of comfortable insularity. It has rested on a set of internally consistent conditions. Business, labour, government and individuals all acted in an economically rational manner within the economic structure that existed. The behaviour of each major constituency reflected the old paradigm.

While the old economic order has been stable for decades, we would argue that it was an equilibrium in which there was some misallocation of the nation's resources, and more importantly, one in which significant potential wealth was lost to inefficiency. There was little pressure for Canadian firms to innovate in order to compete. In fact, within the old economic order such investments may well have been suboptimal. Government reinforced patterns of corporate behaviour by seeking to insulate the Canadian economy and thereby keep the nation together. The price was limited international competitiveness outside of the resource sector, a lack of dynamism in the economy, and often higher than necessary prices in the domestic market.

4. AN OLD ORDER DISINTEGRATING

A variety of external forces, accelerated but not created by the Free Trade Agreement, are rapidly disintegrating this old economic order. Canadian firms in many industries have or will face strong challenges. Canada is already in the throes of a significant economic discontinuity, and profound structural adjustments are underway.

Although Canadian firms and policymakers have had to respond to threats in the past, they were able to do so in the context of the old order. This will no longer be sufficient. Unfortunately, however, the old order has created barriers to upgrading new sources of advantage. As a result, many Canadian industries possess few of the capabilities necessary to sustain and enhance competitive advantage in a vastly changed environment. Already we see signs of the strain in Canada's macroeconomic performance. These new competitive realities will require changes throughout the economy.

To explore the ability of the Canadian economy to respond positively, the next four chapters analyze the general state of each of the determinants of competitive advantage in Canada, both past and present. Included for each is a discussion of the role of government. The intent of these chapters is to provide a flavour for the general state of Canada's determinants. In reality, of course, Canada's competitive performance in an industry is driven by the state of the diamond in that industry. There is no one diamond that describes all industries. Our goal is to summarize the recurrent patterns we observed in our industry studies and other analyses. In analyzing the state of Canada's determinants, we have used numerous examples from Canada and elsewhere. Our intent is not to rank Canada determinant by determinant, but to point out areas of concern and opportunity for the Canadian economy.

PART III

ANALYZING THE SOURCES OF CANADIAN COMPETITIVE ADVANTAGE

CHAPTER 6

CANADIAN FACTOR CONDITIONS

Factor conditions have played -- and continue to play -- a vital role in the Canadian economy. As discussed in Chapter 2, many of Canada's most internationally competitive industries rely on basic factor advantages. While Canada does have an array of more advanced factors, developed through education, training, and research facilities, advanced factor creation mechanisms remain an area of weakness. Our industry studies found that many firms have experienced difficulties because of a lack of specialized and advanced factors.

This chapter is concerned with the state of Canada's factor conditions, the mechanisms that exist for developing more advanced factors, and the barriers to factor creation in Canada. Economists have typically described factors of production in very broad terms, such as land, labour and capital. However, this type of classification is too general to permit an adequate understanding of how factor conditions bear on competitive advantage in distinct industries. The ten-nation study divided the nations' factor conditions into five categories:

- Physical factors, including resource endowments, climate, size and geographic location;
- Infrastructure, including transportation and communications infrastructure;
- Human resources -- the quantity, skills, flexibility and cost of personnel;
- Knowledge resources, particularly science and technology; and
- Capital resources, encompassing the amount and cost of capital available to finance a nation's industries.

Canada's position in each of these five factor categories as well as the most significant government policies bearing on factor conditions in Canada are assessed in this chapter. Throughout the chapter, frequent reference will be made to the findings of the industry studies in order to highlight particular issues or problems.

1. PHYSICAL RESOURCES

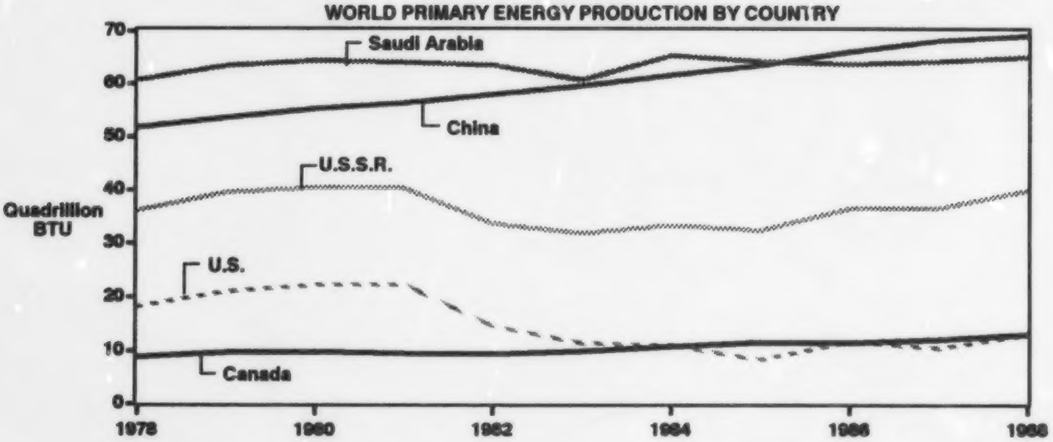
Geography can be viewed as part of a nation's physical resources. Climatic conditions, geographic size, and location all affect competitive advantage. Canada's vast size and harsh climate have left an imprint on its economic development. But perhaps the most fundamental geographic fact is the country's proximity to the United States. This has had an enormous impact on Canada's development and strongly influenced the competitive environment of its industries. Canada and the U.S. share a border stretching more than 5,000 kilometres, with 85 percent of Canadians living within 150 kilometres of the border. Contiguity has made it possible for Canada to export products with otherwise prohibitive transportation costs (for example, unprocessed aluminum and market pulp). The sale of products such as fresh fish and live crustaceans has also been facilitated by Canada's proximity to populous U.S. markets.

Natural resource endowments have been even more important than geographic factors in building Canada's wealth. The Canadian economy, particularly the export economy, has depended very heavily on resources. Canada's international competitive position in many of its leading export industries rests on its ability to sustain advantages in basic factors. Over the long term, this is likely to prove difficult in most resource industries.

Canada's extraordinary natural resource abundance cuts across many industries. Canada is among the world's leaders in a wide variety of renewable resources, ranging from arable and forested land to fisheries. It also ranks among the world's top ten producers of many minerals, including gold and silver (ranked fourth), and nickel and uranium (ranked first).[1] Canada is also the world's fifth largest producer of primary energy (see Figure 6.1), and ranks third among OECD countries in indigenous energy production as a percent of national requirements. Turning to specific energy sources, Canada ranks second in the OECD in crude oil production per capita, third in natural gas production per capita, and sixth in hydroelectric production as a percentage of total energy requirements.[2] Indeed, the latest IMD/World Economic Forum Survey of Business Executives ranks Canada first among 23 developed countries in domestic natural resource endowments.[3]

Figure 6.1

WORLD PRIMARY ENERGY PRODUCTION BY COUNTRY



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION

A. Threats to Sustainability

Canada's resource industries will remain a mainstay of its economy for many years to come. However, the sustainability of the wealth that these resources have generated for the Canadian population depends on many factors. Some of these are within Canada's control -- for example, resource management practices -- but most are not, and are determined by exogenous forces. Threats to the sustainability of natural-resource based advantage are of four main types: resource depletion, the elimination of end markets, the emergence of low-cost competitors, and declining real prices.

i) Depletion

Effective natural resource management practices are critical to the sustainability of any resource-based economy. But even these may not be sufficient. In industries such as fisheries, which rely on stock projections, any number of factors can unexpectedly disturb projected equilibrium levels. In non-renewable resource industries, as current sites are exhausted and Canada is forced to develop new and often more remote resources, the relative costs of Canadian resources will rise.

Resource Management -- A Mixed Record: Canada's record in managing its renewable resources has been mixed. Historically, the expanse of the landscape and the richness and volume of the nation's resources have sometimes led to development practices which, in hindsight, appear wasteful or imprudent. Although the trend in recent years has been toward better stewardship of Canada's resource base, some industries still lag behind international best practices.

For example, until the 1980s, the replanting rates achieved by the Canadian forest products industry were very low. Over the last decade, however, the industry has invested considerable resources in these practices, largely in response to increasingly stringent regulation. As a result, regeneration of harvested forests increased by roughly one fifth between 1977 and 1986. Yet Canada's progress has been outpaced by some of its international competitors. Scandinavian countries have achieved significantly higher yields per acre by supplementing re-forestation activities with active plantation management programs that include ongoing thinning and fertilization. As well, Canadian forest products industries are now faced with a growing problem of soil compaction and erosion that is estimated to threaten the viability of as much as five to ten percent of the nation's total harvestable area.[4] These problems are partly attributable to construction methods for logging roads and to clear-cut logging practices.

In a smaller number of industries, initiatives to achieve sustainable development were put in place earlier, with positive results. The West Coast salmon industry, for example, has been at the leading edge of fisheries management programs. Well-developed stock enhancement programs, administered by the federal Department of Fisheries and Oceans (DFO) in close consultation with the commercial and sports fishing industries, have been in place for several decades. Roughly eight percent of the industry's total annual revenues are allocated to an integrated program of breeding and spawning ground maintenance.[5] Enhancement programs are complemented by close regulation of catch levels, involving both stringent domestic licensing and international treaties with the U.S. to ensure that all Canadian stock improvements accrue to Canadian producers.[6]

Stock Projections -- An Imperfect Science: Even when sophisticated resource management practices are widely adhered to, stock depletion may still be a risk.

Projecting the yields of certain renewable resources is difficult. Stock forecasts are frequently rendered ineffective by unpredictable disturbances within an ecosystem.

Inaccurate projections for Atlantic groundfish have periodically threatened the viability of the industry. With the advent of factory-freezer trawlers in the 1950s and periodic heavy foreign overfishing, groundfish stocks were severely depleted. In 1977, an international agreement was reached on a 200-mile extended economic zone, which has enabled Canada to control its own resources better. The industry dramatically expanded its processing and harvesting capacity in anticipation of the catch increases forecast by the DFO at the time. Unfortunately, the stocks did not replenish themselves to the degree expected -- in part because of foreign fishing practices. By the early 1980s, problems with the resource were being compounded by high interest rates, overcapacity, and poor cost competitiveness.

In response to this situation, the DFO introduced a system of transferable landing rights for the Atlantic offshore sector in 1982. The success of the system has enhanced not only stock management and forecasting capabilities, but also the overall competitiveness of the industry. By eliminating the "race-to-fish" and thereby extending the harvest season, price volatility has been reduced. The quality of the catch has also been improved by reducing the urgency in fish handling. The success of the Canadian system has recently encouraged New Zealand to institute a similar program. In 1990, federal policies were further strengthened by a new catch allocations policy that sets total allowable catches three years in advance, rather than year-by-year, allowing for capacity decisions to be based on more complete information.

Higher Costs of Developing Remote Resources: As current sources of non-renewable resources (and some renewable resources such as timber) are depleted, Canadian firms will be forced to delve deeper into the ground and further into the forests. Accessing more remote sites of supply will be more expensive.

Substantial exploration and development costs are now necessary before a new Canadian mine site becomes productive. The ore yield at Inco's principal mine at Sudbury, for example, has dropped significantly in recent years. Consequently, Inco has had to invest millions of dollars annually in exploration costs. Depletion of existing ore bodies and limited success in replenishing domestic reserves of some minerals pose an increasing threat to the future international competitive position of the Canadian mining industry. Reserves of six major Canadian metals have dropped substantially over the past decade: zinc, lead, silver, copper, nickel, and molybdenum. In the absence of a marked pick-up in exploration activity focusing on metals other than gold, reserves will continue to decline.[7]

ii) The Elimination of End Markets

The sustainability of resource-based national advantage depends on more than just resource availability. As many resource producers have discovered to their discomfort, end markets can evaporate or be eroded through the discovery of synthetic substitutes, or as a result of the changing needs of end-users.

Customer requirements are constantly evolving. With the growing emphasis in the automobile industry on lightweight vehicles, for example, demand for steel has increasingly given way to aluminum and plastic substitutes. In the whisky industry, the sources of competitive advantage have also shifted. Access to low-priced rye was historically a key source of advantage for Canadian producers. With the introduction of continuous cooker technology, however, whisky production needed a lower viscose input than rye in order to permit better process control. As a result of this and other factors, rye now typically constitutes less than five percent of whisky inputs, with corn accounting for the remainder. The Canadian newsprint industry currently faces similar challenges because of the sudden and dramatic increase in newsprint customers' demands for recycled newsprint. With the shift away from virgin newsprint, competitive advantage will be found in proximity to large "urban forests," as well as in access to low-cost pulp.

Over the longer term, technological change has a major impact on demand for raw materials. Demand for many materials -- especially metals -- may be undercut by advances in technology that are reducing the intensity of use of minerals and metals in manufacturing. Some observers refer to this process as "dematerialization," and point to a gradual decoupling of manufacturing from its traditional heavy reliance on raw materials.[8] In addition, the development of substitute materials such as plastics and an expanding variety of "advanced industrial materials" -- for example, polymers, ceramics, and composites -- is likely to result in growing encroachments in end markets long dominated by metals. Again, this trend also poses long term challenges for resource-dependent nations such as Canada.[9]

iii) The Emergence of Low-Cost Competitors

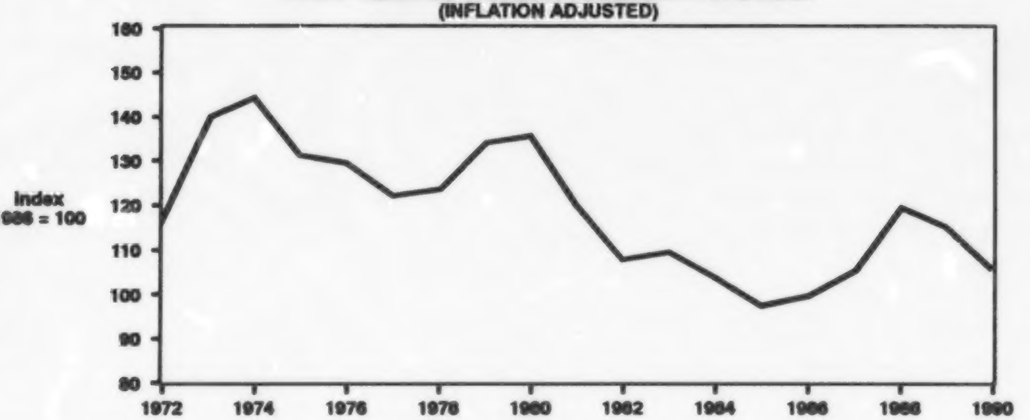
A third threat to the sustainability of Canada's resource-based wealth lies in the emergence of new competitors. In some cases, new production methods have negated or limited traditional natural resource-based advantage. Advances in feed-lot technology, for example, have made it possible for countries without large grasslands to sustain cattle herds, thus eroding traditional export markets for livestock exporting nations. The development of aquaculture, particularly in Norway, may affect the long term prospects of Canada's groundfish industry.

Thermomechanical pulping has made it possible to make market pulp out of Brazilian hardwoods that have a 20-year growth cycle, as opposed to the 100-year cycle of Canadian trees. Venezuela has recently emerged as the world's lowest cost producer of aluminum. The Venezuelan government has developed plans to dramatically boost that nation's share of world aluminum production by the year 2000 as part of a larger effort to achieve a higher level of development through investment in natural resource-based industries. New competitors in nickel have emerged as a result of advances in extraction techniques that have made it cost-effective to mine previously uneconomical laterite ore, and because of the support of national governments in Asia and Africa.

iv) Declining Real Commodity Prices

In commodity industries, increases in supply resulting from technological advances and the discovery of new sites have generally outpaced the growth of demand. In addition, the resource-intensity of modern manufacturing industries has been declining steadily. Under the pressure of these and other trends, world commodity prices have fallen in real terms over most of the last 40 years. Between 1972 and 1990, the real value of Canadian commodity exports generally trended downward, although there was considerable volatility within the period (see Figure 6.2). Even a strong position in commodity industries does not insulate a nation from either sharp cyclical shifts in commodity prices or secular trends toward falling prices.

Figure 6.2
TRADE-WEIGHTED CANADIAN COMMODITY PRICE INDEX
(INFLATION ADJUSTED)



NOTE: INDEX BASED ON ACTUAL PRICES (IN U.S. DOLLARS) FOR CANADIAN EXPORTS
SOURCE: SCOTIABANK ALL COMMODITY PRICE INDEX

Canada still boasts a rich abundance of natural resources and industries that are based on these resources undoubtedly will continue to comprise a major part of the Canadian economy -- especially the export economy. By raising their productivity and/or developing advantages based on more advanced and specialized factors, some Canadian resource industries have been able to meet the challenges posed by resource depletion, technical change, and the emergence of new, low-cost suppliers. Inco's success in dramatically improving the productivity of its Canadian mines in the 1980s is an example of what can be done. However, given the increasing pressures confronting Canadian resource industries, it is unlikely, if they do not adapt to new conditions, that they will be able to generate the economic growth necessary for Canadians to maintain their high relative standard of living into the future. This will be particularly true if these industries continue to base their international competitive advantage wholly or largely on basic factors.

2. INFRASTRUCTURE

Canada has invested considerable resources in developing the physical infrastructure that has been required to hold the country together. Extensive basic transportation networks and advanced telecommunications systems link all regions of the country. Advanced energy systems -- notably pipelines -- have also been developed to overcome long distances and difficult climatic conditions. Competitive industries have consequently emerged in many of these sectors. The latest IMD/World Economic Forum Survey of Business Executives ranks Canada first among 23 developed nations in the extent to which its power supply infrastructure meets business requirements; second in the adequacy of its air transport and road systems; third in both telecommunications and port access; and eighth in the quality of its railroads.[10]

In recent years, concerns have been raised about the adequacy of investment in the maintenance and upgrading of public infrastructure. Airport congestion is a growing problem in several major centres; inadequate attention to highway upkeep is also causing concern. In part, problems in this area are traceable to divided jurisdictions among levels of government. A lack of specialized infrastructure outside of the resource sector is also cause for concern.

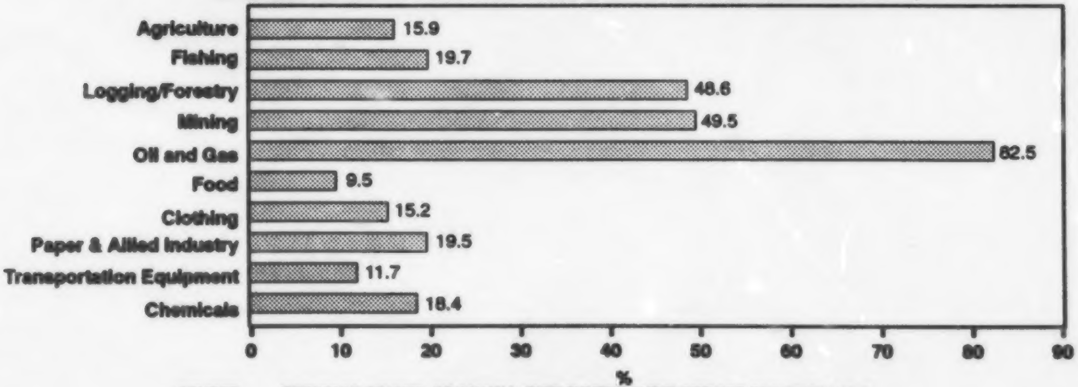
Currently, some of the most critical issues relate to the regulatory frameworks that have governed infrastructure-related services: for example, the trucking and railway industries, telecommunication carriers, and the electrical utilities. These frameworks affect not only the cost of these services, but also, in many cases the extent of ongoing investments to ensure the continued adequacy of the physical infrastructure within which they operate.

A. Regulatory Frameworks

Services are a major determinant of competitiveness in all advanced economies, including Canada's. Services account for at least ten percent of most goods industries' gross output; in many natural resource industries such as oil and gas, forestry and mining, the proportion is significantly higher (see Figure 6.3). Many of the service industries tied to Canada's public infrastructure are regulated. The regulatory environment in which infrastructure-related industries operate can therefore have a major impact on the competitive position of Canadian firms.

Figure 6.3

TOTAL SERVICE INPUT AS A PROPORTION OF TOTAL INTERMEDIATE INPUTS, BY SECTOR



SOURCE: ECONOMIC COUNCIL OF CANADA, *EMPLOYMENT IN THE SERVICE ECONOMY* (1991)

Between the late 1960s and the late 1970s, the Canadian transport and telecommunications industries operated in a less regulated environment than their American counterparts. The Canadian rail industry, for example, benefited from greater pricing flexibility than the U.S. industry, and a higher degree of competition in the form of fewer restrictions on the switching of cargo from one carrier to another mid-route ("interswitching"). This environment fostered innovation in the Canadian industry (for example, the use of "unit trains" dedicated to a single product), and attracted foreign shippers to Canadian carriers. "Overhead traffic" (U.S.-bound foreign cargo that enters through Canadian ports and travels cross-continent by way of Canadian carriers) accounted for a significant proportion of rail volumes at that time. Between 1980 and 1985, however, the U.S. deregulated these industries at a rapid pace, leaving Canada and Canadian firms at a disadvantage. Slower productivity growth has resulted.

A cross-country comparison of productivity growth in the Canadian and U.S. rail industries illustrates the point. Between 1967 and 1979 total factor productivity (TFP) growth in the Canadian industry was more than twice that of the U.S. industry, reflecting, in part, Canada's less restrictive regulatory structure. However, from 1980 when the U.S. deregulated extensively, to 1984, total factor productivity growth in Canada was only 1.4 percent annually, versus four percent in the U.S.[11]

Not surprisingly, higher prices relative to the U.S. for similar services have resulted from more aggressive U.S. deregulation, putting Canadian providers of these services at a disadvantage vis-à-vis their American competitors. Many Canadian firms have responded by routing their transport and telecommunications through the United States. Currently, about 60 percent of container shipments destined for central Canada is brought in through Washington state ports and shipped across the continent via U.S. routes.[12] Cross-continent shipping via U.S. routes was a common practice in many of the industries surveyed. For example, Shell Canada maximizes the routing of its product through the U.S. when transporting styrene from Alberta to the U.S. Northeast because Canadian transportation is not competitive. The Atlantic fishing industry also ships through the U.S. to get its products to markets in central Canada.

Similar patterns have evolved in the telecommunications industry. Deregulation of the U.S. telecommunications industry in 1985 led to much lower long-distance rates for American businesses. Canada, however, has not yet permitted competition within the long distance market, and maintains a regime under which long distance still heavily cross-subsidizes local rates. Price decreases for long-distance services have not kept pace with those in the U.S. As a result, many Canadian firms now route Canada-U.S. long-distance communications via reseller lines. Since 1989, when the resale market was liberalized in central Canada, Canadian resale market revenues have soared from less than $40 million to approximately $180 million.

i) Lack of Coordination

Productivity growth in Canadian transportation and communication industries has been constrained not only by regulation, but also by poor coordination of government policies. The absence of coordination is evident both between jurisdictions (for example interprovincial, and federal-provincial) and between various modes of transport.

Interprovincial Coordination: Until 1989, when federal jurisdiction over the telecommunications industry was clarified by the Supreme Court of Canada, the industry was regulated by a mosaic of overlapping authorities. Since then, the federal government has drafted new legislation to establish a single federal regulator with control over price and service throughout the country. The passage of the federal legislation has been delayed pending provincial support. The complexity of Canada's regulatory system has impeded the introduction of increasingly advanced communications systems such as high-speed, broad-band, metropolitan and wide-area networks.[13]

Interprovincial barriers have also militated against the development of an efficient trucking industry in Canada, as well as encouraging the high degree of fragmentation evident in this sector. Although steps have been taken to deregulate the industry, *de facto* barriers to free movement between the provinces have not yet been dismantled. Province-by-province variations in equipment standards, hours of operation and safety codes have continued to restrict interprovincial operations.

Distortions Between Substitute Modes of Transport: Regional politics and historical patterns of development have resulted in a plethora of hidden subsidies to the transport sector in Canada. The continued use of both direct and indirect subsidies, together with the inconsistent application of cost recovery programs, has distorted inter-modal competition.[14] These distortions undermine the overall efficiency and productivity of the Canadian transportation system and the industries that rely on it.

Pressures to level the playing field between substitute modes of transport have been greatest in the Canadian rail and truck industries. The railways are the only mode of transport responsible for their own infrastructure, including the costs of both construction and maintenance.[15] The railways must also pay property taxes, in addition to fuel taxes. Intercity truck and bus operators, on the other hand, pay license fees and fuel taxes, but are not directly responsible for infrastructure costs. Canadian railways have argued that these differences serve as an effective subsidy for other modes of transport (primarily trucking). Significantly, railway operating costs are roughly 25 percent higher in Canada than in the U.S.[16]

Subsidies for the transportation of grain from the Prairies to East and West Coast ports have distorted both transportation decisions and agriculture production decisions. Rail transport has been favoured over trucks, even from remote, low-volume locations where trucking would likely be less costly. Grain production has been favoured over other commodities that are not eligible for transportation subsidies. Similarly, grain processing in the Prairie provinces has been discouraged because the processed products are not eligible for subsidies. Although the federal government reformed the legislation relating to these grain subsidies in the early 1980s (by passing the Western Grain Transportation Act), most of the distortions remain.

ii) Recent Developments in Transportation

In 1987, the federal government introduced changes to the National Transportation Act to reduce the role of government in the transport sector. A primary objective of this initiative was to enhance competition not just within various modes of transport, but between them. The new legislation was based on the principles of less regulation, greater reliance on market forces, and greater openness and accessibility in the regulatory regime.

The new regime has put downward pressure on transportation prices, heightened competition, and forced considerable adjustment in previously protected Canadian transportation industries, particularly trucking. Many new firms have entered the trucking industry since deregulation; many existing owner-operators have seen their profits severely squeezed or gone bankrupt, while some larger trucking firms have scaled back operations or merged. Deregulation is also paving the way toward lower prices and improved service for thousands of Canadian shippers in a variety of goods-producing industries. The international competitiveness of Canadian industries dependent upon the domestic transportation system is being strengthened under deregulation.

A pressing concern for the transportation sector is its exclusion from most of the provisions of the Canada-U.S. Free Trade Agreement. Increased market access is essential if Canadian carriers are to achieve the scale necessary to sustain comparable productivity levels overall. The U.S. shipping industry successfully lobbied for an exemption from the FTA. In the Great Lakes region, where both Canadian and U.S. vessels travel without restrictions, the Canadian industry has captured 90 percent of the region's total shipping volume due to lower operating costs. In coastal or intercoastal waters, however, access for Canadian vessels is restricted by the U.S. Jones Act (Merchant Marine Act, 1920). Current negotiations for a bilateral "Open Skies" air agreement are a step in the right direction.[17] Currently, U.S. air carriers have rights to Canadian centres covering 94 percent of the Canadian population, whereas Canadian carriers currently reach less than 15 percent of the U.S. population.

B. Specialized Infrastructure

As discussed in Chapter 3, specialized factors typically yield more significant and sustainable competitive advantage than generalized factors, which are available to a wide range of industries and sometimes do not differ greatly among nations.

To the extent that investments have been made in specialized infrastructure in Canada, attention seems to have been focused principally on the resource sector. Large-scale investments have been made in the development of specialized infrastructures required to transport natural resources, such as gas, to market. Extensive networks of access roads have been built by and for the logging and mining industries. The styrene industry has benefited from the development of a network of pipelines that provide producers in Quebec and Ontario with western feedstock.[18]

In many cases, various levels of government have paid for or subsidized much of the capital costs of these projects. Priorities in establishing specialized infrastructure in Canada are sometimes driven by regional development/equity considerations, rather than economic goals. Examples are found in the federal and provincial governments' support for the northeast coal project in Tumbler Ridge, B.C., and in federal subsidies for grain transport systems in the Prairie provinces. In the case of Tumbler Ridge, $1.5 billion in public grants was channelled through two Crown corporations for the development of two railways required to take the coal from the mine to port, as well as to construct a new port and coal-loading facility near Prince Rupert.[19] The existing coal industry in British Columbia lobbied unsuccessfully against investment in a region so far removed from the current core of the industry in southern B.C. The emergence of a significant oversupply in world coal markets has subsequently threatened the viability of all B.C. coal operations. In the case of grain transport, the government has purchased virtually all of the specialized grain cars currently employed by the railways.[20] In addition, the federal government subsidizes two-thirds of grain transport costs, under the guidelines set forth in the "Crow Rate." It also requires that the railways maintain branch lines even when uneconomic.

Private sector investments have been successfully leveraged in the case of the aluminum industry. The provincial government has long supported the development of the aluminum industry in Quebec. Recently, the federal government granted $78.8 million to improve facilities and transportation infrastructure at the port of Sept-Iles in order to accommodate traffic generated by the new Alouette consortium smelter. In addition, the governments of Canada and Quebec each contributed $5 million to the city of Sept-Iles for the construction of the industrial infrastructure required for the Alouette project. This focused government support facilitated private investment in the project.[21]

C. Excellent Quality of Life

Infrastructure means more than just roads and telephones. In the 1990s, factors affecting the overall quality of life are also relevant to attracting and retaining a highly-skilled and increasingly mobile labour force. Here Canada offers many advantages. According to the United Nations Development Program's 1991 human development report, for example, Canada is the second best place in the world in which to live.[22] It is a heavily urbanized nation, enjoying a very high standard of living. Home ownership rates are among the highest in the world behind only the U.S. and Spain,[23] and average commuting times are relatively short.[24] In a recent study by a U.S.-based research group, both Montreal and Toronto ranked in the top five most livable big cities in the world.[25]

Access to health care facilities is universal. Canada has a very low infant mortality rate, and average life expectancy is second only to Japan among G7 nations.[26] Canada spends more on its public school system per capita than any other G7 nation.[27] Until recently, public satisfaction with the education system has been high: less than five percent of the student population in Canada is enrolled in private schools.[28] Postsecondary education is extensively subsidized for all citizens.

Nor should less tangible considerations be overlooked. In the IMD/World Economic Forum's Survey of Business Executives, Canada ranked first among the G7 nations in terms of "citizens' trust in the administration of justice," and access to "equal opportunity."[29] A 1988 "Where-to-be-born" survey by *The Economist* noted that Canada had the most desirable passport of the 50 countries surveyed.[30]

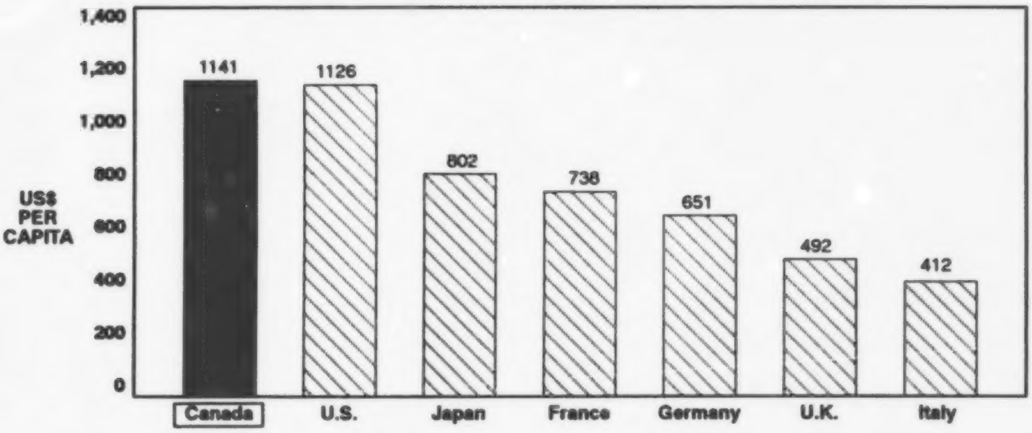
3. HUMAN RESOURCES

Human capital is becoming perhaps the most important source of competitive advantage in the contemporary world economy. Resource-poor nations such as Japan and Switzerland -- and more recently Taiwan and Korea -- have built successful economies based, in large part, on the strength of their human resources. Clearly, the quantity, skill and cost of a nation's personnel all affect national advantage.

By traditional indicators, Canada's workforce appears well educated. Canadian per capita spending on education is the highest of all G7 nations (see Figure 6.4). Postsecondary attainment rates in Canada are also among the highest in the world.[31]

Figure 6.4

PUBLIC EXPENDITURE ON EDUCATION, 1987 PER CAPITA (U.S.$)



SOURCE: IMD WORLD COMPETITIVENESS REPORT

Yet these positive aggregate indicators mask a number of trends that suggest Canada's labour force is not adjusting adequately to the forces of change in the global economy. As discussed in Chapter 1, Canadian productivity growth has lagged behind most other G7 nations, and other countries are fast catching up to Canada (and the U.S.) in absolute productivity levels. Of more concern are what appear to be increasing structural rigidities in Canadian labour markets. While relatively high levels of unemployment have persisted, labour shortages have been reported in a growing number of occupational sectors. Basic skill levels are inadequate for a wealthy nation and too few Canadians are developing the specialized and advanced skills that are increasingly important in building competitive advantage.[32]

Serious weaknesses in labour market adjustment mechanisms are evident. Canadians who are unemployed tend to stay that way longer. The number of people who fall into unemployment is extremely high: according to Statistics Canada, one in five Canadians who filed an income tax return collected unemployment insurance benefits in 1989.[33] Even though unemployment spells are very common, only a relatively small proportion of the unemployed pursue retraining or skill upgrading while out of work. Increasingly, the unemployed consist not of new entrants to the workforce, but of older workers who lack the skills to adapt to a changing industrial climate.[34] Regional disparities in employment levels have also widened.[35]

This section will examine these trends in Canada's human resources. We begin by considering basic skill levels, then proceed to discuss advanced skills, specialization, and indicators of labour force flexibility.

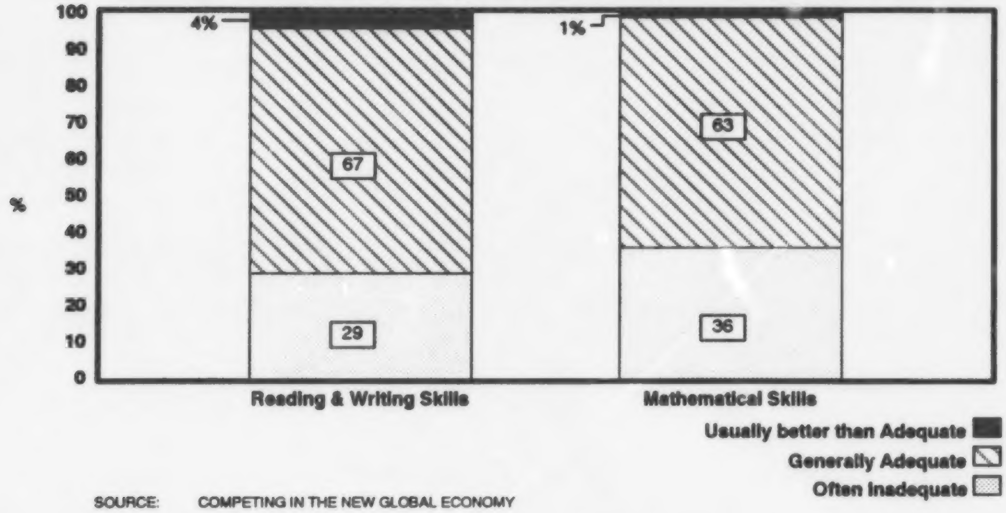
A. Basic Skill Levels

While the aggregate data on education spending suggest a high overall level of education in Canada, closer examination reveals a very uneven distribution of educational qualifications across the population. More than 30 percent of Canadians do not complete high school.[36] Equally disturbing is that among those who do have at least a high school diploma, an estimated 30 percent cannot meet most everyday reading demands or understand a simple sequence of numerical operations.[37] A 1987 survey estimated that among the general population, the illiteracy rate stood at 24 percent.[38]

The consequences of inadequate levels of basic educational attainment and competency have been widely felt throughout the Canadian economy. Individuals who are functionally illiterate, and/or who have low educational attainment (for example, high school dropouts), are far more likely to have low incomes and to experience long-term unemployment than better educated citizens. Deficiencies in basic education thus lead directly to higher social costs in the form of financial support from the state for the poor and unemployed. Inadequate basic skills also have implications for industry. Seventy percent of the companies surveyed in a 1990 Conference Board of Canada study reported a significant problem with functional illiteracy at some level in their organizations.[39] In a 1985 survey of the auto parts industry, close to one-third of all managers stated that the reading and writing skills of their workforces were inadequate for the job (see Figure 6.5).

Figure 6.5

MANAGERS' PERCEPTIONS OF EMPLOYEE SKILL LEVELS: ONTARIO AUTO PARTS INDUSTRY



SOURCE: COMPETING IN THE NEW GLOBAL ECONOMY

A 1988 study by Woods Gordon estimated the direct costs of illiteracy to Canadian businesses at almost $2 billion annually.40 This amount significantly understates the true economy-wide costs of the problem, since it ignores social costs (for example higher welfare and unemployment payments) and does not capture the opportunity costs of failing to develop a substantial fraction of the nation's human capital. Some employers have responded to the problem of inadequate basic skills by organizing in-house literacy programs. In 1988, Northern Telecom teamed up with its union to participate in a literacy pilot project of the Ontario Federation of Labour. Basic Education for Skills Training (BEST) has now spread to more than 100 organizations in Ontario. While such initiatives are laudable, the resources of firms are better directed to developing more specialized skills and expertise. Providing a basic education and a strong foundation of basic skills is the job of the nation's school system.

Pronounced weaknesses in the basic skill levels of Canadian workers are particularly worrisome given the trend toward higher average skill requirements for all occupations in all industrialized economies. More than half of the new jobs created in Canada in the 1990s are projected to require more than 12 years of formal education/training. Yet, approximately 60 percent of the current Canadian work force has only a high school education or less.41

B. Advanced Skill Levels

Advanced, rather than basic skills, play the biggest role in building sustainable competitive advantage in firms and industries. Advanced factors are integral to the design and development of a firm's products and processes as well as to its capacity to innovate. Advanced skills are scarcer because their development demands large and often sustained investments in both human and physical capital. Advanced factors are also more difficult to procure in global markets. Canada, for example, has found it increasingly difficult to rely on immigration as a means to meet skilled labour shortages.[42]

Structural shortages are emerging in several occupational sectors that require advanced training and education, notably in technology-related occupations. The outlook for skilled trades appears especially dire. As well, the adequacy of Canada's future supply of engineers is also being called into question. Most troubling is the fact that, in both of these fields, institutional and attitudinal biases exist that appear likely to constrain Canada's ability to adjust to increasing requirements for such skills in the future.

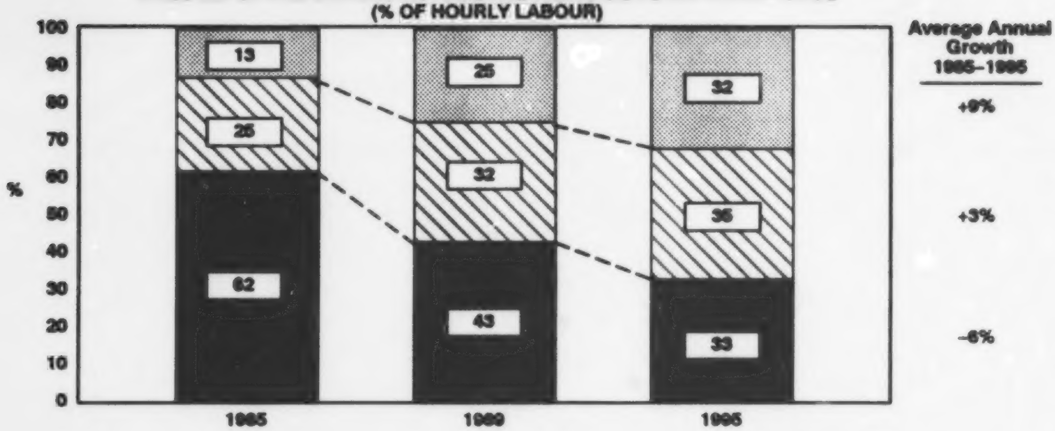
I) Skilled Trades Shortages

The IMD/World Economic Forum Survey of Business Executives ranked Canada 15th out of 23 developed countries in terms of skilled labour "availability" and 11th for "quality."[43] Evidence of shortages of skilled labour is widespread. A 1989 survey of a large group of high technology firms by the Canadian Labour Market and Productivity Centre found that 55 percent of these firms had difficulty recruiting and retaining professional, scientific and technical staff, while 34 percent had the same problem with respect to skilled trades.[44] During the late 1980s, Statistics Canada reported that 14 percent of manufacturers were experiencing production impediments due to a lack of skilled labour. This was up from two percent in 1985. In the 1980s, $2.8 billion was spent on computerization in the ailing textile industry, only to find that firms could not hire enough skilled technical workers to run the new machines.[45]

In the auto parts industry, a shortage of skilled labour -- particularly tool and die makers -- seriously constrained growth in the 1980s. In a 1989 survey of the Ontario auto parts industry, 39 percent of firms reported that they had had to curtail operations due to shortages of trained personnel.[46] Skilled labour shortages stemmed in large part from dramatic shifts in the skill mix required by the industry as a result of changes in technology. In the 1989 survey, over 60 percent of the auto parts plants that had introduced equipment technology (such as robots, numerical control equipment, automated material handling equipment, and CAD systems) had done so within the preceding five years. Ninety percent of all Statistical Process Control (SPC) users -- the most widely reported process technology in the industry -- had been using the technology for less than five years; two out of three users had introduced it within the preceding two years.[47] With these advances in technology has come a significant increase in the average skill levels required by auto assemblers and parts manufacturers. Between 1985 and 1989, unskilled labour as a proportion of the industry's total hourly labour requirements declined from 62 percent to 43 percent; it is forecast to drop a further ten percentage points by 1995 (see Figure 6.6).

Figure 6.6

SKILL MIX OF THE ONTARIO AUTOMOTIVE PARTS INDUSTRY WORK FORCE (% OF HOURLY LABOUR)



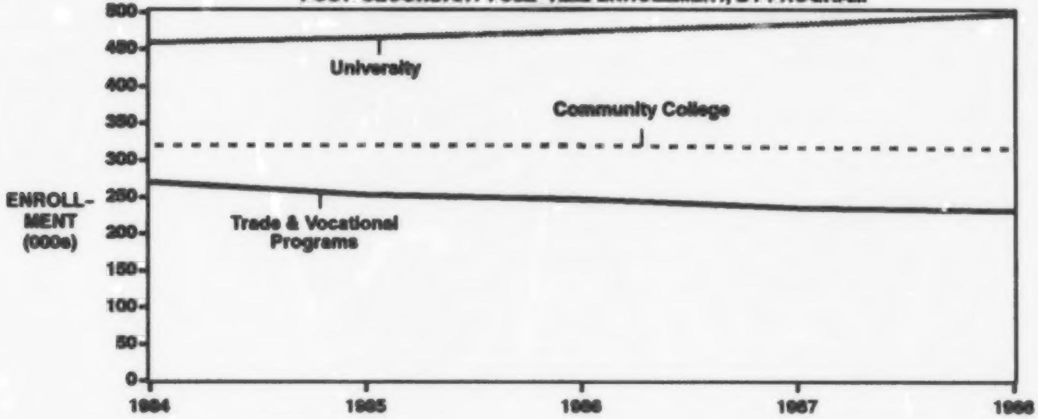
SOURCE: REPORT OF THE AUTOPARTS HUMAN RESOURCE STUDY CANADA CONSULTING CRESAP, 1990.

The importance of highly skilled trades/technical personnel can be seen in the prefabricated manufactured housing industry. The log home segment of the industry has benefited from the availability within Canada of a unique pool of skilled craftsmen. The presence in Canada of three internationally recognized schools for log builders has played a significant role in building this specialized factor pool. An international reputation for quality and craftsmanship has helped Canadian companies make major inroads into the demanding and fast-growing Japanese market in recent years. However, shortages of skilled workers have continued to plague the industry and limit its growth potential.

Weaknesses in Technical Education: The advanced skills problem in Canada does not lie in a lack of opportunities to pursue higher education. Indeed, Canada has one of the highest postsecondary attainment rates in the world. Rather, the critical problem is the small proportion of high school graduates opting for further education with a technical orientation. Technical post-secondary programs and vocational schools ideally should exist as respected alternatives to university training. But in Canada, alternatives to a university education in the form of skills or vocational training are widely perceived to be "second best." A recent report from the Association of Canadian Community Colleges observed that "one of the most serious barriers to individuals undertaking technology programs is the very high value placed on university degrees by Canadian society."[48] Echoing this, a survey conducted by the Canadian Manufacturers' Association revealed that 70 percent of all high school students aspired to go to university and 80 percent of parents wanted their children to follow this route.[49]

Postsecondary enrollment patterns in the 1980s suggest that this bias has become further entrenched. While university enrollment has grown, enrollment in community college programs (which have a stronger technology orientation than university programs) has been flat and that in trade and vocational programs has actually fallen (see Figure 6.7).50 The relative lack of prestige associated with technical and vocational education in Canada may partly reflect established industry priorities regarding blue collar versus white collar workers.

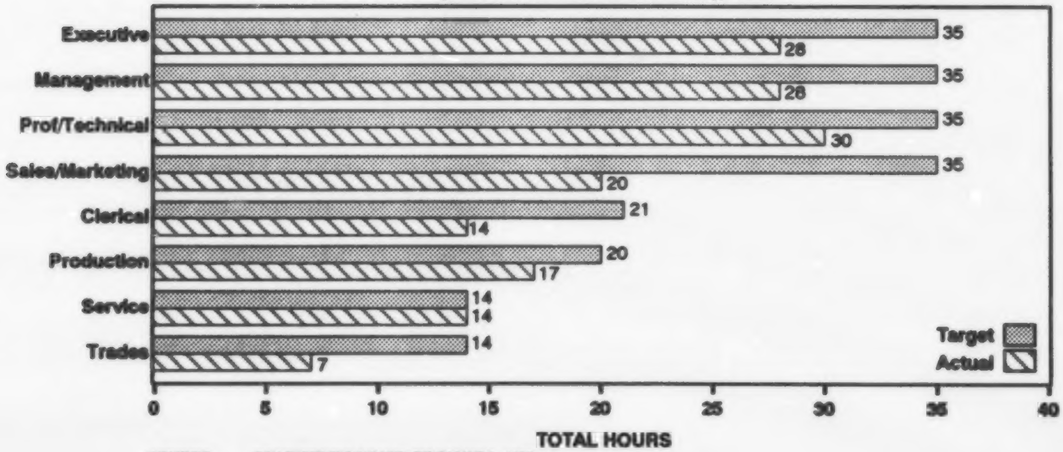
Figure 6.7
POST-SECONDARY FULL-TIME ENROLLMENT, BY PROGRAM



SOURCE: STATISTICS CANADA 81-229

Low Priority of Vocational Training: Analysis of corporate training investments by occupation provides evidence of the priority given to white collar professions by Canadian employers. A 1990 survey by the Conference Board of Canada revealed that sales and managerial staff typically receive approximately four times as much training per capita as trades employees and twice as much as production staff (see Figure 6.8).

Figure 6.8
TRAINING BY EMPLOYEE CATEGORY
(MEDIAN HOURS PER CAPITA), 1990



SOURCE: CONFERENCE BOARD OF CANADA, 1990

Canada's bias in favour of university-educated, white collar occupations is also reflected in a comparison of occupational standards. Certification practices for vocational trades are poorly developed, and few technically oriented occupations have either national standards or mechanisms in place to work toward common standards. In the aircraft maintenance industry, for example, national occupational standards for non-licensed trades do not exist. This recently prompted a number of firms, together with labour representatives, to establish a national committee to develop formal standards for workers in the industry.[51]

There are 170 apprenticeable trades in Canada (compared to 450 in Germany); four percent of Germany's labour force are presently apprentices, versus 0.8 percent in Canada.[52] Apprenticeship is not widespread among occupations in Canada: two-thirds of all apprentices are found in just 10 trades.[53] Moreover, the value of certification is diminished by the inconsistency with which standards are developed and applied. Many are widely considered to be outdated by industry experts and apprentices alike.

In contrast to vocational trades, Canadian standards and accreditation practices for professional white collar occupations generally compare favourably with the best in the world. In some cases these high standards have led to industry advantage. In the life insurance industry, for example, Canada was among the first to establish a strong industry association with the formation of the Canadian Life Insurance Association in 1884. The Canadian Institute of Actuaries had early roots in the Actuaries Club, founded in 1907. Historically, Canadian actuarial standards were viewed as superior to those in the United States. Canada's reputation for exacting standards in the actuarial profession has persisted to this day, even though Canada and the U.S. have now harmonized their examination requirements.

Professional accounting accreditation standards in Canada are also among the most demanding in the world. Undergraduate curricula in Canada are more highly standardized and comprehensive than those in the United States. The qualifying work requirements are also more stringent in Canada. Students generally must complete two years of work requirements and qualifying admission examinations, both of which are standardized nationally. Although both countries administer national quality examinations, Canada's essay and "professional judgment" case method is seen to be superior to the American multiple choice examination format. Recently, the U.S. proposed adopting the Canadian format.

Institutional Factors Reinforce Biases: In part, prevailing Canadian attitudes and priorities toward different occupations may have been inadvertently reinforced by institutional factors and government policies. Two recent initiatives by the federal government in the area of science and technology, for example, have reinforced the notion of a community college education as second best. The Canada Scholarship Program was introduced in 1988 as a means of encouraging more students to consider further education in science and technology. Yet students planning to enroll in these programs at community colleges are not eligible. Nor are the community colleges as institutions eligible for R&D grants made available under the federal government's Matching Funds Policy.

Deficiencies in Canadian apprenticeship programs have contributed to skilled labour shortages. The apprenticeship system in Canada suffers from a complex set of problems, including antiquated program structures, restricted access, and a lack of standardized certification criteria. Skilled labour shortages in Canada are inextricably linked to the difficulty of attracting and sustaining adequate enrollment levels in many of the apprenticeable trades most important to industry. Overall, apprenticeship enrollments declined by 42 percent between 1982 and 1988; and dropout rates now exceed 40 percent.[54] Moreover, the strongest programs are typically found in the construction and auto mechanic-related trades; these account for 40 percent and 26 percent, respectively, of Ontario's apprentices. Industrial apprenticeships represent just 20 percent of the total -- in the province with the largest manufacturing sector in the country.[55] Indeed, a recent statement issued by Siemens Canada suggested that while it hoped to quadruple its 3,000 person workforce within a decade, it feared that the skilled labour required would simply not be available.[56]

Most apprenticeship curricula are outdated. A recent survey of apprenticeship program participants found that roughly one-third of those who dropped out before satisfying the requirements did so because they thought the curriculum was either irrelevant or inadequate to fulfill the requirements of the trade.[57] For most trades, the in-school portion of the program is administered by community colleges. It is not clear that the community college system, as it is currently structured in most provinces, is well suited to administering programs that require constant modification and close collaboration with industry.

Apprenticeship enrollment has also been seriously constrained by limited access. Direct entry from high school is difficult because there is no formal system that channels interested students into the trades. Before enrolling, prospective apprentices must first identify a prospective employer. In some trades, access is virtually impossible without first becoming a union member, which is rarely possible without prior work experience. As a result of these features of the apprenticeship system, the average age of apprentices in Ontario is 26, as opposed to 16 in Germany.[58]

Closer links between high schools and the workplace are essential. Only 30 percent of students entering high school go on to postsecondary education.[59] Yet few programs provide students not bound for university with courses to assist them in making the transition to the workforce. Only recently has industry begun to define a role for itself in this process. In the auto parts industry, one southern Ontario supplier recently teamed up with the Wellington Board of Education to participate in Canada's first School Workplace Apprenticeship Program (SWAP) for high school students. Not only does the additional labour fill immediate labour shortages, but it helps to build the profile of skilled trades within high schools and reduce high school dropout rates. At the provincial level, Quebec recently announced the introduction of a trade-oriented "Professional Studies" diploma program for high school students.

The absence of consistent and well-regarded certification procedures has also hampered the development of apprenticeship programs in Canada. Among those trades that do have either regulated or voluntary certification, there are no universally recognized standards for the "shop floor" component of the program. Even the in-class requirements often vary markedly from province to province. These inconsistencies have diminished the value of certification, and thereby reduced the incentive to complete apprenticeship training programs. A recent survey of apprenticeship dropouts found that "in occupations where a tradeperson's qualification certificate was generally required, graduates earned considerably more than dropouts; where there was no such requirement, the reverse was true."[60]

Although the need for apprenticeship program renewal in Ontario and several other provinces is widely recognized, progress has been slow. Consequently, some industries have embarked on initiatives of their own. In the nickel industry, for example, a recent partnership between Inco and Cambrian College in Sudbury has produced an apprenticeship training program targeted broadly to the mining and metallurgical labour force. In the program's first year of operation, 60 students graduated from a 48-week course that combined academic studies with on-the-job training at Inco.

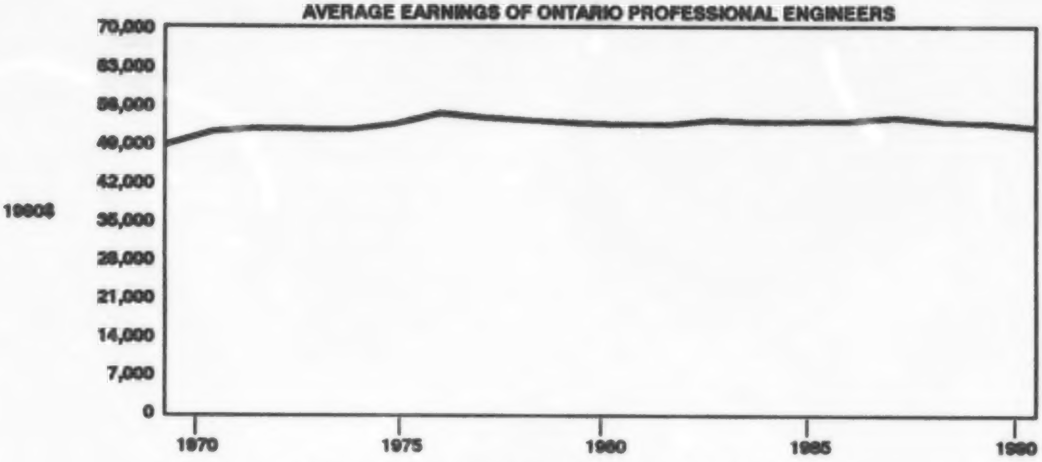
Most German and Swiss students do not go on to university. Instead they enter three- or four-year apprenticeship programs that combine schooling with on-the-job training. At the end of the program, students enter the workforce with the company they have apprenticed for, go to work for another company, or seek further schooling. Curricula for apprenticeship schools are developed by local authorities in close conjunction with industry associations and individual companies. Programs provide education, job training, and youth employment -- major labour market challenges in all advanced nations. Graduates of these programs are highly trained, technically competent, well motivated, and have a theoretical base from which to enhance and build their skills.

In addition, apprenticeship programs and their graduates are highly respected in Germany and Switzerland (and several other European countries), and many corporate and political leaders have been through such programs. Apprenticeship and vocational training programs in these nations are seen as offering desirable career tracks. They attract high calibre participants and benefit from extensive ongoing industry and union support.

ii) Projected Shortages of Professional Engineers

Engineering capabilities were the only advanced human resource that recurred as a source of advantage among the industries studied in this project. Civil engineering is, of course, at the heart of the consulting engineering industry. Similarly, the development of Canada's mining and materials cluster has relied heavily on advanced and specialized engineering capabilities in the fields of geophysics and earth sciences. Electrical engineering has been critical to the development of the electric power, central office switch and commercial flight simulator industries.

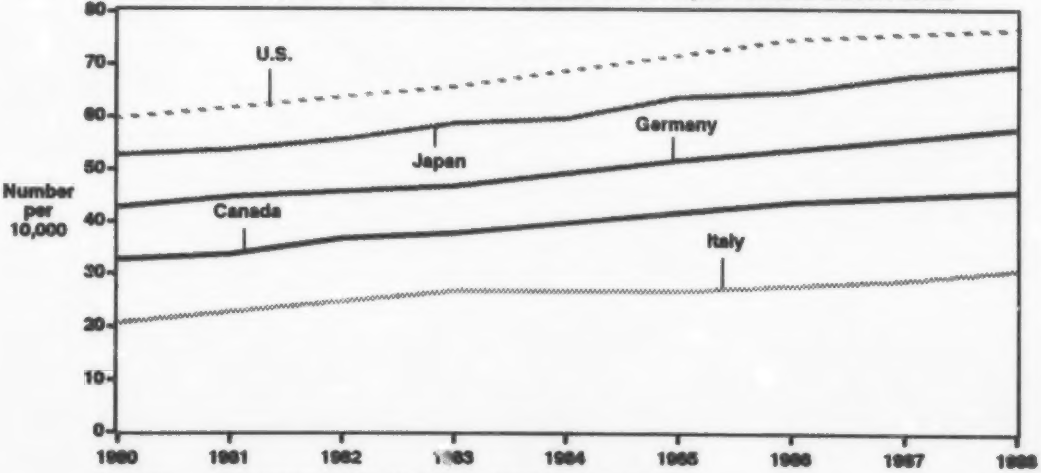
Figure 6.9
AVERAGE EARNINGS OF ONTARIO PROFESSIONAL ENGINEERS



SOURCE: ONTARIO ASSOCIATION OF PROFESSIONAL ENGINEERS--MEMBERSHIP SURVEY

Yet, Canada's ability to sustain and upgrade this source of advantage is being called into question by many. Northern Telecom and Ontario Hydro, among other major employers, have forecast severe shortages of engineers in the coming decades.61 Shortages of critical engineering skills have also been identified as a problem by firms in the Canadian commuter aircraft industry. Currently, the market for engineers appears to be in balance -- engineers' salaries adjusted for inflation have essentially been flat for the last 20 years (see Figure 6.9). However, Canada employs fewer engineers per capita than most other industrialized nations (see Figure 6.10), and a surge in demand could disrupt the current equilibrium. On the supply side, declining enrollment levels relative to the total post-secondary student population are cause for concern.

Figure 6.10
RESEARCHERS, SCIENTISTS AND ENGINEERS PER 10,000 TOTAL LABOUR FORCE

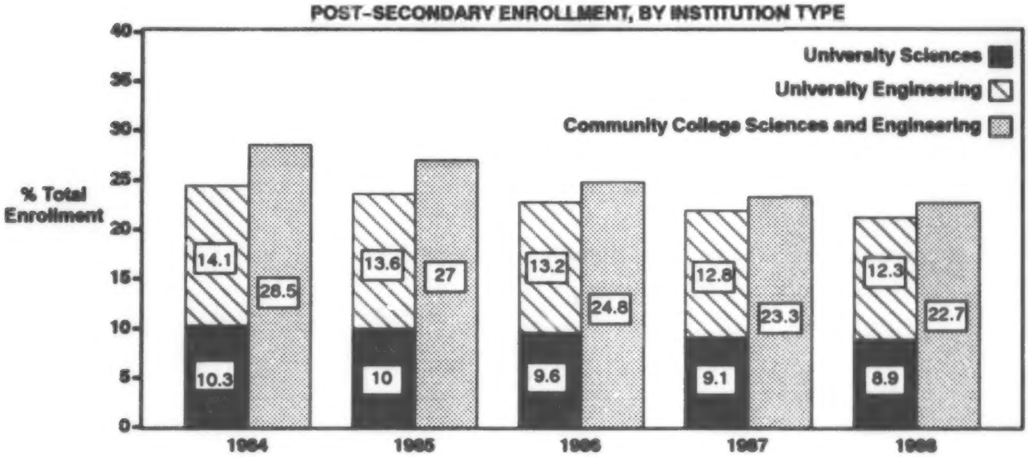


SOURCE: OECD SCIENCE AND TECHNOLOGY INDICATORS, 1989, GRAPH 8

University and college enrollment levels in science and engineering have been flat or in slight decline over the last five years, at a time when overall postsecondary enrollment levels have been increasing (see Figure 6.11). During the same period, the proportion of Ontario university applicants selecting science, engineering or math programs as their program of choice upon entry has dropped from 31 percent to 26 percent. Consequently, academic entrance requirements for engineering programs have fallen at four out of five Ontario universities.62

Figure 6.11

POST-SECONDARY ENROLLMENT, BY INSTITUTION TYPE



SOURCE: STATISTICS CANADA [CATALOGUE 81-229]

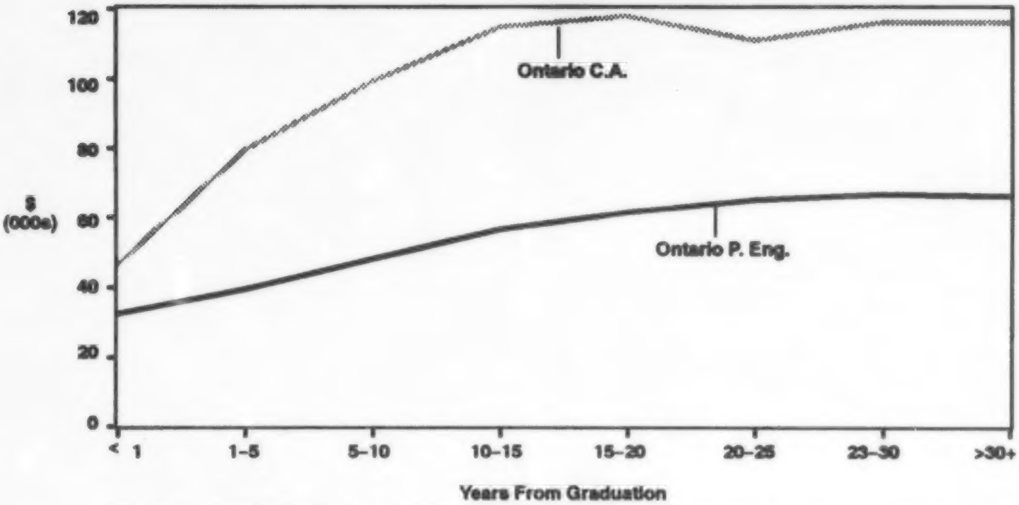
In part, engineering's declining proportion of both incoming students as well as the total university population can be traced to low female participation rates. Engineering faculties have the lowest female participation rates of all university faculties in Canada. While women now comprise half of the total undergraduate population, they account for just 14 percent of engineering undergraduate students.63

Limited Prestige In Engineering: In a recent survey of high school students completed for the Premier's Council in Ontario, no engineering or science-related occupations were ranked among the top ten preferred careers; students opted instead for such careers as management, sales and law, and by a wide margin.64

Part of the problem may lie with the financial incentives associated with the profession. A comparison of Professional Engineer salaries with those of Chartered Accountants -- both require similar levels of education -- is revealing in terms of the relative value that Canadian industry attaches to the two professions. Although the starting salaries for C.A. and P.Eng. qualified professionals are roughly comparable, Chartered Accountants will earn more than twice as much as Professional Engineers by the time they have been practicing for ten years (see Figure 6.12).

Figure 6.12

AVERAGE ANNUAL EARNINGS OF ENGINEERS AND CHARTERED ACCOUNTANTS, 1989



SOURCE: ONTARIO ASSOCIATION OF PROFESSIONAL ENGINEERS; CANADIAN INSTITUTE OF CHARTERED ACCOUNTANTS (ONTARIO); NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Low salary levels are made even less attractive by the cyclical nature of many of the industries that hire most of the engineers in Canada. One pulp and paper equipment executive interviewed recalled that in the last downturn in the industry, over 20 percent of the industry's engineers found themselves unemployed in British Columbia. It is perhaps not surprising, then, that fewer than 50 percent of engineers remain in practice more than ten years after university graduation.[65] As one industry observer remarked, "engineers in Canada don't have a shop floor culture. We train them not to invent, but to manage and move on. The goal of Canadian engineers is to get out of engineering."[66]

Poor Science Programs Discourage Engineering Study: As with vocational trades education, various institutional factors have reinforced students' orientation away from the engineering professions. The low priority given to science curricula in Canadian schools is undoubtedly a contributing factor. Teachers on the whole have little postsecondary training in science or mathematics disciplines. A 1984 survey by the Science Council of Canada found that 60 percent of elementary school teachers had taken no courses in university-level mathematics or science. It was not surprising, then, that only 27 percent of teachers at the middle level and just 14 percent of elementary teachers judged themselves "capable of dealing with science and technology effectively."[67]

Poor preparation in science and mathematics can make it exceptionally difficult for students to pursue an engineering education at the post-econdary level. Canadian student performance on international math and science examinations has been mediocre at best (see Figure 6.13). High school students have fared particularly poorly.

Figure 6.13

SECOND INTERNATIONAL SCIENCE STUDY (1986)

LEVEL	CANADIAN SECTION	RANK	# OF COUNTRIES PARTIC-IPATING
Grade 9	French English	9 4	18
Final Year	• Both French and English ranked in the bottom four on core test and in each of specific subject tests (for example, biology, chemistry)		

SECOND INTERNATIONAL MATHEMATICS STUDY (1989)

LEVEL	CANADIAN SECTION	RANK	# OF COUNTRIES PARTIC-IPATING
Grade 8	B.C. Ontario	3 4	8
Final Year	B.C. Ontario	6 7	7

SOURCE: ECONOMIC COUNCIL OF CANADA

Inadequate teaching and curricula at these developmental stages affect not only the science literacy of the population as a whole, but also the motivation of individual students to consider further education in science and technology-related fields. In recent years, enrollments in science faculties at the postsecondary level have fallen significantly. Several universities, including Queen's University, the University of Toronto and the University of British Columbia, have actually lowered minimum grade standards for entry into the Bachelor of Science program in an attempt to stabilize declining enrollment levels. In 1991, Bachelor of Arts entry requirements at some universities will exceed those for Bachelor of Science programs for the first time.[68]

C. Specialization Discouraged

An important finding of the ten-nation study is that specialized factors of production provide stronger and more enduring bases for competitive advantage than generalized factors. Specialized factors are usually necessary in the more complex or proprietary company activities, and they are also necessary for more sophisticated forms of competitive advantage. Germany's competitive advantage in optics, for example, is in large part due to the availability of graduates from special university programs in optical physics and a pool of highly skilled workers trained in specialized apprenticeship programs. In the Canadian cobalt radiation therapy equipment industry, highly specialized skills developed in various institutes dedicated to nuclear medicine research have been instrumental to the industry's success.

The lack of specialized programs at Canadian postsecondary institutions has recently surfaced as a problem in both the engineering profession and various technology-oriented occupations. While degrees in engineering are currently offered at many Canadian universities, relatively few offer highly specialized programs. The lack of specialized programs appears to be manageable for large companies such as Northern Telecom and Alcan, which can offer extensive in-house training programs to new recruits. But it poses more serious problems for mid-size and smaller firms. Canadian auto parts suppliers, for example, point out that no Canadian university offers a degree program in automotive mechanical engineering. In-house training requirements are therefore extremely burdensome (typically, two or more years). Pulp and paper companies also draw attention to insufficient specialized programs, with only two master's programs and two technical schools devoted to pulp and paper studies in all of Canada.

Similar problems appear in many occupational sectors. As will be seen when we look at other factor conditions, factor specialization has historically been concentrated in fields of expertise directly tied to resource industries. The Petroleum Industry Training Service, for example, offers training for a broad range of occupational and professional needs. Of the 33 universities offering accredited engineering programs in Canada, eight offer degree programs in agricultural engineering, and ten offer programs in geological engineering -- reflecting the historical prominence of agriculture and mining in Canada's economy.[69] By contrast, in the field of industrial engineering, possibilities for degree specialization are very limited.

i) Barriers to Factor Specialization

Developing specialized human resources requires more focused, and often riskier, private and social investments. In Canada, several factors have limited the degree to which business, governments and educators have been willing to channel educational dollars toward specialization.

In part, the inadequate degree of program specialization stems from traditionally weak links between business and education in this country. Postsecondary education funding patterns have also served to discourage specialization.

Industry-Education Cooperation: The specialization of human resources is aided by programs that supplement academic studies with focused, on-the-job experience in a particular field. "Cooperative education" programs have proven particularly beneficial in this regard. In Canada, cooperative education has been part of several universities' curricula since the late 1950s. However, absolute participation levels remain low, and less than half of all Canadian universities offer such programs; moreover, co-op students account for only ten percent of total university enrollment. Among students who do participate, the majority are concentrated in science or engineering faculties. Arts students currently account for only four percent of total co-op participants.[70]

Fortunately, a growing number of universities and colleges -- even high schools -- are now integrating co-op opportunities into their academic curricula. The number of postsecondary institutions offering co-op programs has more than doubled in the last ten years. Thirty-five universities and 48 colleges and technical institutes are members of the Canadian Association for Cooperative Education. Some 140,000 students across Canada (including some at the high school level) now participate in cooperative education programs supported by governments.[71] The University of Waterloo alone has over 10,000 students enrolled in co-op programs, primarily in engineering and accounting. Its co-op program in actuarial science is the largest in North America, accepting 125 applicants in an increasingly competitive admission process. Several co-op programs have directly benefited a number of the industries surveyed in this study. Northern Telecom has actively participated in engineering co-op programs for a number of years. At any one time, up to 2,000 interns and co-op students may be working for NT and Bell Northern Research in Canada.

In part, the growing popularity of co-operative education can be attributed to a program launched by the federal Department of Employment & Immigration, which pays up to 85 percent of a co-op program's set-up and administration costs in its first year of operation. Funding levels are then phased out over a subsequent four-year period. Funding for this program is slated to quadruple under the federal government's new Labour Force Development Strategy.[72]

Greater human resource specialization may also result from industry participation in the curriculum-setting process at educational institutions. Earlier this year, the Quebec government, in cooperation with the Canadian aerospace industry, announced through the Centre d'Adaptation de la Main-d'Oeuvre Aerospatiale au Québec (CAMAQ) the establishment of a new $13 million aerospace technical school scheduled to open in 1992.[73] CAMAQ previously played a pivotal role in the founding of master's degrees in aerospace engineering now offered at four Quebec universities -- all of which require a training phase at one of the member companies. Recently, the Society of the Plastics Industry of Canada teamed up with an Ontario community college to launch an industry-wide training program for skilled trades related to the plastics industry. Many more initiatives along these lines are urgently needed to strengthen Canada's ability to produce highly-skilled and more specialized workers.

Funding Patterns Discourage Specialization: One of the biggest obstacles to greater specialization of educational programs in Canada lies in the mandate and funding patterns established for postsecondary educational institutions.

In Canada, tuition fees at all postsecondary institutions are highly regulated to ensure access; there are no private universities. Consequently, fees currently account for less than 20 percent of Canadian postsecondary revenues, versus roughly 50 percent of private university revenues in the U.S.[74] Without flexibility in setting tuition levels, universities are often not able to recoup the extra costs of highly specialized programs. Although the current system of public funding weights sciences more heavily, the revenue differentials are frequently insufficient to cover the higher costs associated with specialized or technical programs of study.

The rationalization of resources at the postsecondary level has also been impeded by the breadth of the mandate which governs Canadian universities. No distinction is made in Canada between teaching and research institutions; all universities must disseminate and generate knowledge. This contrasts with the situation in the United States. Consequently, virtually all universities in Canada offer both undergraduate and graduate programs of study.[75] The provincial and federal university granting councils have also tended to stretch funds thinly in their efforts to ensure a "baseline teaching capability" throughout the system and in all regions. Research dollars are consistently allocated almost directly in line with population.

Factor specialization has been further discouraged by funding patterns that pay insufficient attention to the need for critical mass in developing true centres of excellence. The provinces have complete autonomy in establishing postsecondary programs. Consequently, competing rather than complementary programs often evolve from province-to-province. Faculty specializations and capabilities are scattered throughout the country. Canada, for example, maintains 16 publicly-funded medical schools and a similar number of law schools, in the absence of compelling evidence that all of these are necessary.

D. The Labour Force

As in other countries, the flexibility of the labour force is becoming an increasingly important competitiveness issue in Canada. Although there are some positive signs, present practices and past traditions do not paint a particularly encouraging picture. A weak private sector training effort, and the legacies of an adversarial and inflexible industrial relations system, are among the principal problem areas.

i) Weak Commitment to Training

The importance of the issue of industrial training in Canada has been magnified by the convergence of several trends. First is the ever-shortening technology life cycle. A recent Ontario survey, for example, reveals that many of the skills acquired by technicians and technologists during the course of their formal education are obsolete within three to five years of graduation.[76] (This is not, of course, a uniquely Canadian trend.)

Second is Canada's inability to rely, as it so often has in the past, on immigration to fill occupational shortages, particularly in occupations requiring high skill levels. Several of the industries studied during our research relied heavily on immigrant labour at various stages in their development. In the early days of CAE Electronics, for example, a significant proportion of the engineering staff was recruited from overseas. Immigrants who came to Canada after World War II played a leading role in the early evolution of the geophysical contracting industry. Immigrants have also comprised a large proportion of the tool and die makers in the auto parts and many other metal manufacturing industries. In recent years, Canada has experienced a dramatic drop in the number of immigrants designating high-skilled technical occupations as their intended occupation.

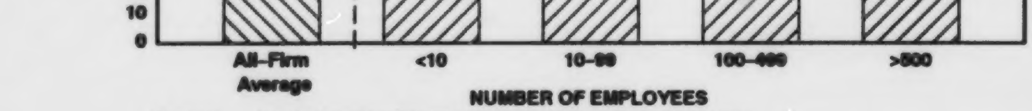
Finally, demographic projections point unmistakably to an aging labour force (and population). By the year 2001, 15- to 24-year-olds will make up only 17 percent of the labour force, down from 20 percent in 1980, and 27 percent in 1970.[77] Increasingly, Canadian employers will have to meet their need for skilled workers by retraining those already in the labour force.

In many respects Canadian industry is ill-prepared to meet the training challenge, and slow to recognize its urgency. Business executives surveyed for the most recent IMD/World Economic Forum world competitiveness report ranked Canada 20th out of 23 developed nations in the effectiveness of in-company training programs in strengthening industrial competitiveness.[78] A 1987 survey by Statistics Canada estimated that employers in Canada spent just $1.4 billion on formal employee training, equivalent to 0.6 percent of payrolls and less than 0.3 percent of GDP. The results of this survey have been disputed by many. Yet even if the figure reported were doubled, Canadian spending would still amount to only half of what German employers commit to vocational training (1.2 percent of GDP).[79] Perhaps most disturbing is that less than one-third of all Canadian firms offer any sort of formal training at all to their employees. And the bulk of the training provided is directed at professional and managerial employees.[80]

In contrast, Japanese firms -- like their German counterparts -- invest considerable resources in employee training. Japanese on-the-job training is rigorous and essential for advancement within the firm. Many Japanese managers have to pass internal examinations in order to win promotions. On-the-job training is continuous (reaching the postdoctoral level in some firms) and focuses on the specific skills and fields relevant to the company's industries. Japanese companies are able to recruit new employees by drawing on a large pool of well-educated youth with sound basic skills and high levels of literacy, which allows them to tailor in-company training programs to meet their specific and specialized requirements. This is more difficult in Canada, where a disturbingly large fraction of the labour force lacks basic skills.

Figure 6.14

FIRMS OFFERING TRAINING, BY FIRM SIZE (1987)



SOURCE: EIC, HUMAN RESOURCE TRAINING AND DEVELOPMENT SURVEY, 1987

In Canada, a firm's propensity to offer training tends to be directly and positively correlated with its size (see Figure 6.14). The high relative importance of small and medium-sized enterprises to the Canadian economy may, therefore, have the effect of limiting expenditures on formal training. In our industry studies, most of the examples found of well-developed training programs were in the country's largest firms. At Boeing de Havilland, for example, each employee receives an average of 2.5 hours of in-house training each month. In-house training programs at Canada's biggest life insurance firms are considered comparable to those maintained by leading American and British competitors. Canadian insurance firms appear to have developed an edge in training career agents, largely due to the unusual importance of that distribution channel to the Canadian industry. Canada consistently ranks in the top three countries worldwide in terms of insurance sold per agent.[81] Northern Telecom is at the forefront in developing in-house training programs and fostering a training "culture." The firm ensures that 100 percent of its employees receive some kind of formal training each year, and allocates 1.5 to 2 percent of its total revenues on training.[82] Major Canadian chartered banks also spend heavily on employee development, devoting approximately two percent of payroll to training programs.[83] Many more companies will need to follow in the path of these companies and industries if Canada's work force is to be competitive in the years ahead.

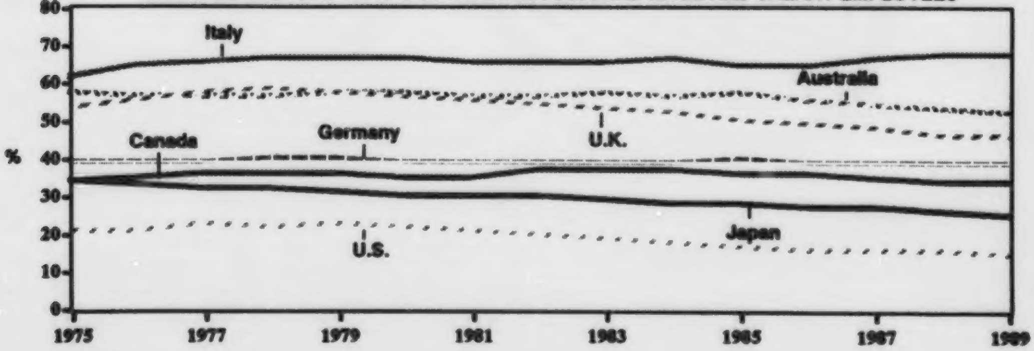
ii) Adversarial Industrial Relations

The nature and tone of industrial relations in a country can have a major impact on the speed and ease with which its industries and firms are able to innovate and upgrade. Improvements in productivity at the firm level depend upon relationships that reflect a clear understanding of the interests common to both labour and management, as well as upon the ability of the parties to cooperate in pursuing those interests in the workplace setting. In Canada, relations between labour and management have often been strained. This has inhibited flexibility and complicated efforts to improve productivity in many industries.

Based on international evidence (including the ten-nation study), absolute levels of unionization do not appear to have a decisive impact on the ability of a nation's firms to increase productivity or compete successfully. Although unions represent a bigger share of the labour force in Canada than in the U.S., most European nations have higher rates of unionization than either Canada or the U.S. (see Figure 6.15). (Note that the aggregate figures for unionization in Canada are inflated by very high levels of unionization among public sector employees.)[84] Widespread unionization has not prevented many leading European industries from competing successfully. Japan and most European countries have benefited from more productive relations between labour and management than Canada, the U.S. or the U.K.

Figure 6.15

UNION MEMBERSHIP AS A % OF NONAGRICULTURAL WAGE AND SALARY EMPLOYEES



SOURCE: U.S. DEPARTMENT OF LABOR, BUREAU OF LABOR STATISTICS

The adversarial nature of industrial relations in Canada reflects a seeming inability of labour and management to identify common ground. Each has traditionally defined its interests in narrow terms and displayed limited enthusiasm for real partnerships in the workplace. Understandably, this has sometimes made it difficult to build consensus in the face of competitive threats. Distrustful labour-management relationships have affected the competitive position of Canadian firms in a host of industries, including pulp and paper, automobile assembly, steel, and mining.

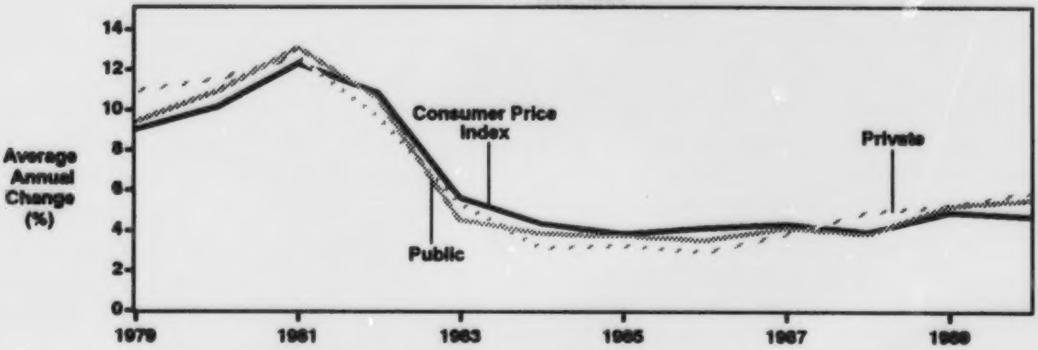
At least in part, the counterproductive nature of labour-management relations in Canada can be attributed to a preoccupation -- on both sides of the bargaining table -- with short-term issues and a lack of commitment to long-term prosperity. In developing their strategies, unions in Canada have historically given top priority to job security and compensation growth. That union leaders and members are concerned about these issues is not surprising, but this ordering of priorities has been accompanied by a failure to acknowledge the central role that firm or industry profitability plays in enhancing workers' welfare and security over the long run. However, it is also a product of a common tendency, on the part of Canadian management, to treat labour as a short-run, variable cost rather than an investment in long-term profitability. In addition, it reflects a perception among labour leaders that senior management is unwilling to consult openly with them on issues affecting long-term corporate strategy.

Labour Resistance to Change: To varying degrees, Canadian unions have resisted developments geared to increasing productivity and firm profitability -- for example, multiskilling and performance-related compensation schemes. Historically, there have also been numerous instances in which union environments have been reluctant to embrace technological change. In the early 1980s, for example, the Longshoremen's Union at the Port of Vancouver slowed the adoption of container shipping technology by imposing a "de-stuffing clause" on certain shipments. A significant volume of West Coast shipping traffic was lost to the American port of Seattle-Tacoma as a result. While federal legislation eventually removed the stipulation, the lost volume of business has yet to be fully recovered.

More recently, unions' concerns over job security have centred on the reorganization of the workplace that accompanies technological change. Many unions have opposed the introduction of multiskilling, a process which gives firms greater flexibility in matching labour to immediate production requirements. Multiskilling has been perceived as a threat to union strength on the grounds that it reduces the importance of individual workers by making all workers "as interchangeable as machine parts."[85] Multiskilling also poses a threat to the rigid seniority systems that continue to govern many lower-skilled jobs. When Weyerhauser, for example, tried to introduce multiskilling to its B.C. pulp and paper mills in 1981 and 1985, its union effectively blocked the initiatives. Partly as a result of these difficulties, Weyerhauser estimates that its previous labour cost advantage relative to southeastern U.S. mills has now become a significant cost disadvantage.[86]

Efforts to enhance firm productivity in Canada have also been undermined by the reluctance of organized labour to accept that compensation growth at the firm level should be more closely tied to performance. Canadian unions typically focus on general economic indicators, not firm or productivity performance, in setting wage demands. Wage settlements negotiated through collective bargaining agreements over the last ten years have closely tracked the Consumer Price Index (see Figure 6.16). In all, less than ten percent of Canadian union members are covered by collective agreements with wage incentive provisions; and only two percent of unionized workers by agreements that provide for productivity bonuses or profit sharing plans.87

Figure 6.16
MAJOR WAGE SETTLEMENTS, PUBLIC VS. PRIVATE SECTORS
1979–1990



SOURCE: LABOUR CANADA

Some Canadian unions have strongly resisted initiatives to link compensation more closely to performance-based measurements. In 1985, the United Auto Workers Union in the U.S. accepted contracts that included profit-sharing plans. The Canadian branch of the UAW, however, refused to accept any linkage between pay increases and company performance, and insisted on negotiating contracts providing for straight wage increases. That same year, the Canadian branch withdrew from the UAW, largely over disagreements with respect to pay bargaining strategy.88

Union resistance to performance-based compensation reflects a variety of concerns. The prospect of significant variations in pay is, understandably, unattractive to many workers. The exclusion of labour from the corporate planning process (discussed below) inevitably contributes to union skepticism about more flexible work rules or compensation systems. As well, unions worry about the impact that pay-for-performance and profit sharing schemes might have within their membership. In 1988, the United Fishermen's Union rejected the concept of lump-sum productivity bonuses for employees, in part due to the anticipated complexities of negotiating such plans, but also because union officials were concerned about the potential divisions that might develop among shoreworkers.

Union fears also reflect broader anxieties about the longer term implications of new directions in labour-management relations. This anxiety was captured in a recent CAW statement on the reorganization of work:

> In a recent set of negotiations we resisted offers of the team concept. We told them that we are workers, paid an hourly wage, with good benefits. I want something to say about the conditions in my workplace, but I do not under any circumstances want to be their partner. [The team concept] will eliminate union leadership. Workers will be talking against workers, teams against other teams, one department against another . . .[89]

Firms Fail to View Labour as an Asset: Management in Canada has fuelled union suspicions about innovative approaches to work organization and compensation such as pay-for-performance, profit-sharing, multiskilling, teamwork and quality circles. Managers of Canadian firms have frequently taken actions and adopted priorities that reflect both an authoritarian approach to workforce management and a narrow view of employees' potential to contribute to firm goals. Little evidence exists that Canadian firms in general have made a sustained commitment to their labour force. In general, the prevailing management outlook is characterized by a tendency to view labour as a variable cost, not a "fixed asset." This attitude, which contrasts sharply with the outlook of most companies in Japan, Germany and several other successful economies, has consequences for the competitiveness of Canadian industry.

Viewing labour as a variable cost has encouraged frequent resort to layoffs as a short-term response to competitive forces or downturns in the economy. The long-run implications of this short-term cost orientation to managing the work force have often been overlooked by Canadian firms. Reducing the volatility of "boom and bust" hiring patterns has not been a priority for most firms. This management attitude has done little to encourage worker loyalty and self-investment in upgrading, nor has it assuaged union anxieties over job security.

Firms in Canada have been reluctant to invest in the upgrading and maintenance of their human resources. As noted in the previous section, investments by Canadian firms in employee training have been low by international standards. Moreover, the training investments that firms have made have been mainly directed to managerial and professional employees. And often training investments have been reactive -- seeking to satisfy immediate job requirements rather than to anticipate future needs.

The absence of a sustained commitment to human resource upgrading on the part of a significant portion of Canadian management is also evident in a reluctance to invest in the retraining of displaced workers. A report by the New Brunswick Federation of Labour found that only four percent of the workers who lost their jobs as a result of technological change had received training to prevent them from being laid off.[90] "Management seems to have little faith in the intelligence and trainability of its workforce. The preference is to recruit people with training rather than to upgrade the skills of existing staff."[91]

Canadian firms have a poor record of including unions in the planning process. A 1989 survey by Labour Canada revealed that labour was rarely consulted in the implementation of new technologies. Many companies have not established labour-management structures to address issues surrounding technological change.[92] Failure to work with labour in the implementation of technological change has often been cited as a factor preventing Canadian firms from optimizing the productivity-enhancing potential of new technologies.

iii) Training and Industrial Relations: Some Positive Signs

Increasingly, unions have come to accept the inevitability of new technologies. In many cases, changes in attitude have grown out of a situation of intense pressure from international competitors. In a recent report to its membership, for example, the Canadian Auto Workers (CAW) observed that "it takes a great deal of technology to affect job numbers to the same degree that a 30 percent import market share does."[93] Similarly, in a 1989 report to Labour Canada, the International Woodworkers of America concluded that the job impact of technological change was less of a concern than the impact of deteriorating industry competitiveness. "If it were not for the extreme reduction in unit production costs brought about by high productivity, severely depressed lumber markets would have caused job losses greatly exceeding the 12 percent decline which took place between 1978 and 1984." This message had clearly reached the union's rank and file. A 1988 survey of the IWA's membership found that fewer than one-quarter were "against" technological change.[94]

Indeed, most unions have now seen that technological change typically results in relatively few direct layoffs. Where the process of change is managed well, redundancy often can be handled through attrition. In fact, a recent Conference Board of Canada survey concluded that union leaders' concerns with job security now centre not on whether new technologies are acceptable, but rather on the processes and timeframes through which they are implemented.[95]

Cooperative Efforts Emerging: In recent years, cooperative initiatives to improve and expand training opportunities and forge better management-labour relations have been pursued in a number of industrial sectors and in many more individual companies. Such initiatives, which tend to receive little public attention, have typically emerged from "crisis" situations that have sensitized both labour and management to the high price of continued conflict.

Scott Maritimes, for example, had suffered 17 months of downtime in its 20-year history when, in 1987, it established a training trust fund. Labour was charged with the development and financing of its own training programs. The result has been the adoption of an extremely effective technical training program in the company.

Stelco has had similar success with the introduction of multiskilling programs. Although the Canadian branch of the United Steel Workers of America (USWA) had strongly opposed previous efforts by Stelco to institute multiskilling, a severe downturn in the industry through the late 1980s led to renewed efforts by the firm. Negotiations produced joint labour-management committees to oversee training for multiskilled workers. Stelco also guaranteed the union that layoffs would not result from productivity gains related to multiskilling. Over the past two years, more than 90 percent of Stelco workers have participated in its multiskilling training program.[96]

Shell Canada's Sarnia plant provides a further example of the type of work organization favoured by forward-looking companies in response to drastic slimming in the ranks of middle managers and supervisors.[97] Managerial staff and supervisors have little role in running the Sarnia plant; the workers do this themselves, through semi-autonomous work teams whose mandates were negotiated between Shell and its union. There are only two work classifications -- process operators and maintenance technicians. Thanks to multiskilling (and more training), the average member of a work team is able to perform 70 percent of the tasks required to run the plant. Compensation is linked directly to skill and knowledge, rather than simply to seniority or the job itself. Employees are intimately involved in most aspects of decision-making.

Government programs aimed at bringing labour and management together to improve labour market flexibility -- and at fostering a shared commitment to training -- have enjoyed modest success. These initiatives basically operate outside of the collective bargaining process. With financial support from Employment and Immigration Canada and the Ontario government, a number of firms in the electrical and electronics industry, together with major unions present in the industry, recently launched a Sectoral Training Fund. Designed to allow workers to upgrade and broaden their skills and to help companies meet specific training needs, the STF is funded through a levy on employers equal to 0.25 percent of payroll matched by an identical contribution from employees, with the two governments together contributing an amount equal to another 0.5 percent of payroll. The size of the STF will thus be one percent of industry payroll. The training supported by the fund is intended to be incremental to what firms in the industry already provide.[98]

The B.C. forest products industry has traditionally been characterized by hostile relations between labour and management. In the mid 1980s, however, with the industry mired in a severe downturn and the IWA having seen its membership drop from 55,000 in 1980 to 35,000, both parties were disposed to forge a more cooperative relationship. With assistance from Employment and Immigration Canada's highly-regarded Industrial Adjustment Service, labour and management jointly established the Western Wood Products Council. Under the auspices of the WWPC, labour and management have jointly explored issues ranging from the threat of deforestation, to the image of the B.C. industry in overseas export markets.[99]

The Quebec government has recently been successful in developing a "social contract" between management and labour at Atlas Steel, though its required investment was high. In return for a $100 million loan by the province, Atlas management and their union representing all 411 Atlas employees, agreed on a six-year period of labour peace. Furthermore, if temporary layoffs become absolutely necessary, Atlas management agreed to be responsible for placing the affected workers in rigorous training programs to upgrade their job skills until their return was required.

An earlier and somewhat similar initiative is the Canadian Steel Trade and Employment Congress (CSTEC). Established jointly by steel companies and the United Steel Workers of America in 1985, and funded predominantly by government, CSTEC has been preoccupied with issues such as industry downsizing, worker adjustment and retraining, and trade questions. In contrast to the Sectoral Training Fund, CSTEC is not focused centrally on upgrading the skills and flexibility of workers remaining in the industry. Thus, while the initiative is beneficial to participants, it is unlikely to result in a stronger human resource base for the beleaguered steel industry. Nor does it appear to have materially improved strained labour-management relations in the industry. Indeed, both Algoma and Stelco suffered lengthy strikes in 1990, severely impacting short-term financial performance and long-term customer relationships.

4. KNOWLEDGE RESOURCES: SCIENCE AND TECHNOLOGY

Knowledge resources encompass a nation's stock of scientific, technical and market knowledge bearing on goods and services. The stock of scientific and technical resources has a significant impact on the strength and sustainability of the competitive advantages enjoyed by a nation's firms. Knowledge resources can be assessed using two types of performance indicators: those that measure the "inputs" applied to the development of science and technology, and those that measure "outputs" (that is, the production of new knowledge).

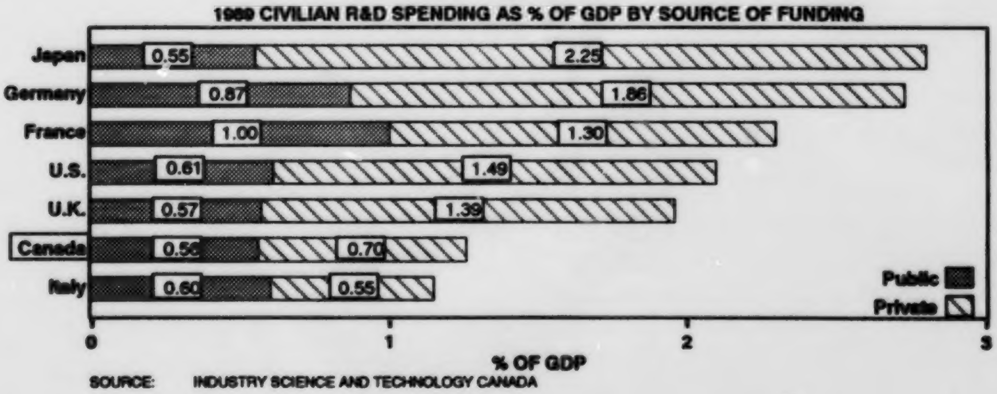
Canadian performance in science and technology reveals some disturbing trends. This section of the chapter looks at both expenditures on research and development and selected aspects of technology creation and diffusion.

A. Low Level of Private Sector R&D Expenditures

Science and technology inputs are most commonly measured by R&D expenditures. As noted in Chapter 1, Canada spends less on R&D as a percentage of GDP than any other G7 nation except Italy. In some of these countries, notably the U.S., defence-related R&D expenditures account for a portion of the difference. However, Canada's poor ranking holds true even when defence spending is extracted from R&D totals (see Figure 6.17).

Figure 6.17

1989 CIVILIAN R&D SPENDING AS % OF GDP BY SOURCE OF FUNDING



SOURCE: INDUSTRY SCIENCE AND TECHNOLOGY CANADA

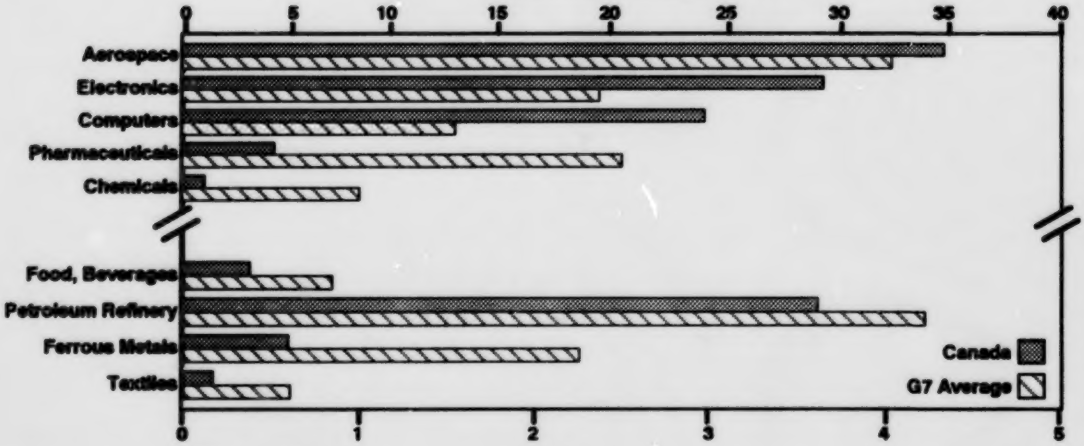
Government expenditures on civil R&D in Canada are roughly equivalent to G7 averages, as Figure 6.17 illustrates. In the area of private sector R&D, however, Canada trails most of its competitors by a wide margin. The private sector accounts for a smaller proportion of total R&D spending in Canada than in all other G7 countries apart from Italy. The Canadian private sector also funds proportionately less R&D than its counterparts in some smaller OECD nations such as Sweden, Norway and the Netherlands.

It is important to put R&D in perspective. R&D expenditures are not necessarily correlated with export success, as evidenced in Canada by the fact that some of Canada's major exporting industries -- pulp and paper, automobiles, energy -- spend relatively little on R&D. The extent of indigenous R&D is, however, strongly correlated with productivity growth and industry upgrading. Many economic studies have found that "technology" accounts for a large fraction, half or more, of productivity growth in advanced nations.100 A nation's R&D effort thus provides a valuable indicator of its potential for productivity improvement and economic upgrading.

Efforts to explain the Canadian private sector's relatively weak commitment to R&D have traditionally looked to structural characteristics of the country's economy: small average firm size, industrial composition, and the high degree of foreign control. Yet the evidence reviewed below suggests that none of these factors is sufficient to explain Canada's low investment in R&D.

Figure 6.18

R&D PROPENSITY (EXPENDITURES/VALUE-ADDED)
CANADA VS. G7 AVERAGE, 1989



SOURCE: ISTC

I) Industrial Composition

Figure 6.18 suggests that Canada's relatively greater reliance on industries that are less technologically intensive is not a sufficient explanation for low overall R&D investments. On the contrary, it appears that it is precisely in the "low-tech" -- that is, primarily resource-based -- industries that Canadian performance is weakest compared to G7 averages. In food/beverages, textiles, petroleum, and ferrous metals, the R&D propensity of Canadian firms was below that of their G7 competitors. On the other hand, Canadian firms in the "higher-tech" industries included in the figure ranked with the best in the world in R&D spending. This was borne out in several of our industry studies. CAE Electronics commits approximately 25 percent of its sales to R&D, and has an impressive record of flight simulator technology firsts to show for its efforts.[101] In the 1970s, it developed a unique four-degrees-of-freedom-motion system, a major simulator component. In the 1980s, CAE designed the Fibre Optic Helmet Mounted Visual Display (FOHMVD), a technological breakthrough in visual systems incorporating fibre optics. Mounted on a helmet, the FOHMVD gives the pilot trainee a wider field-of-view than previously available displays. Northern Telecom also leads the way among its international competitors in terms of R&D spending. BNR, the largest private research lab in Canada, has concentrated on applied research in the telecommunications field. Through the efforts of Northern Telecom and BNR, Northern Telecom was the first company to introduce a complete line of digital central office switch equipment, and it continues to be a world leader in fibre optic technology.

By contrast, Canadian R&D expenditures in resource-based industries have frequently lagged behind those of major international competitors. The Canadian pulp and paper industry, for example, spends just 0.3 percent of sales on R&D. In the U.S. and Sweden, the industry devotes one percent of sales to R&D; in Japan and Finland, the figure is 0.8 percent.[102] Other Canadian resource-based sectors that spend relatively little on R&D include petroleum and gas (0.5 percent of sales in 1987), non-metallic mineral products (0.4 percent), ferrous metals (0.3 percent), and food and beverages (0.2 percent).[103]

The nickel industry provides an interesting exception to the predominant Canadian pattern. Over the last ten years, Canadian nickel firms have significantly increased their commitment to R&D, largely in response to the industry restructuring that took place in the early 1980s.[104] Consequently, all three of the major Canadian players are now at the forefront of technology development in this industry. Inco is a world leader in the development of new applications for nickel and new production technologies; Falconbridge has led the way in developing SO_2 emission reduction technologies; and Sherritt Gordon is the world leader in hydrometallurgical and powder metallurgy processes.

ii) Firm Size

A comparison with the U.S. would seem to support the hypothesis that Canada's small average firm size might negatively affect its R&D levels (see Figure 6.19). In the U.S., as in Canada, small to medium-sized enterprises (SMEs) account for a small portion of R&D expenditures relative to their share of total manufacturing output. Yet there is no inevitability to this pattern. The German experience runs counter to that of the U.S. and Canada. In Germany, SMEs account for a larger share of private sector R&D expenditures than of manufacturing output. Examples of impressive R&D capabilities and performance on the part of smaller firms can also be found in Canada. In the geophysical contracting industry, for example, intense rivalry has fuelled a fierce and sustained commitment to product innovation. Though the average firm size is only 25 to 30 employees, the industry commits a significant portion of its sales to formal R&D. As a result of these investments, the Canadian geophysical industry has consistently been at the forefront in developing and commercializing new surveying techniques.

Figure 6.19

COMPARISON OF INDUSTRIAL R&D EXPENDITURES BY FIRM SIZE

FIRM SIZE BY NUMBER OF EMPLOYEES	% OF TOTAL MANUFACTURING SHIPMENTS (DOLLARS)			% TOTAL R&D EXPENDITURES		
	CANADA[1]	U.S.[2]	GERMANY[3]	CANADA[4]	U.S.[5]	GERMANY[3]
< 500	64.3	21.6	12.9	30.5	9.2	16.8
> 500	35.7	78.4	87.1	69.5	90.8	83.2

SOURCE: U.S. NATIONAL SCIENCE FOUNDATION; U.S. CENSUS OF MANUFACTURERS; STATISTICS CANADA [CATALOGUE 88-202, 31-203]; STIFTVERBAND FUER DIE DEUTSCHE WISSENSCHAFT

[1] 1986 [4] 1987
[2] 1982 [5] 1988
[3] 1985

iii) Foreign Control

As we have discussed, the central issue in understanding firms' investments in upgrading is not ownership, but firm strategy. Foreign-controlled firms that operate in Canada strictly for reasons of market access are likely to commit fewer resources to factor upgrading in general, and to R&D in particular. In contrast, the R&D investments of foreign-controlled firms that have developed home bases in Canada for a product line or business unit typically equal or exceed the average R&D spending levels for their industry. Several such firms are among the largest performers of R&D in Canada. In the aircraft industry, for example, the Canadian subsidiary of Pratt & Whitney is the home base for the design and production of small gas turbine engines. The Canadian operations have consistently committed 15-20 percent of annual sales to R&D efforts.[105] IBM Canada, which ranks among the country's top ten R&D spenders, focuses its activities in areas which support world product mandates for power suppliers and software products for mid-range computers.[106] Du Pont Canada, which also has world product mandates from its American parent, ranks as the 17th biggest private sector R&D spender in Canada.[107]

Where Canadian subsidiaries have not successfully developed a home base, the variance in spending propensities between the Canadian operations and international averages can be substantial. The Canadian subsidiaries of the big three U.S. auto assemblers, for example, collectively spent only $40 million on R&D in Canada in 1987, compared with more than $8 billion in the U.S.[108] In the styrene industry, almost all R&D is centralized in the U.S.; Canadian R&D activities are centred on adjusting products and processes to Canadian market specifications (for example, antifreeze technologies and "sour gas" utilization).

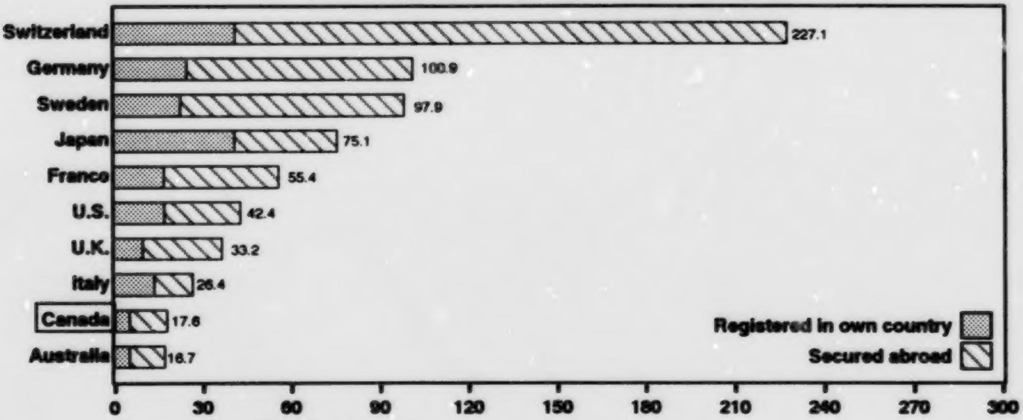
B. Slow Creation and Adoption of New Technologies

Canada's record in scientific and technological outputs is consistent with its under-investment in R&D inputs. Overall, the country does not appear to be strong in either creating or adopting new technologies.

Canada's record relative to other nations is most impressive in the area of basic R&D (using bibliometric measures as a proxy). Canadians perform approximately two percent of the world's R&D, but account for roughly four percent of all published scientific papers.[109] The difficulty seems to lie in translating scientific and technical knowledge generated by scholarly research into process and product innovations. Patent registrations provide one measure, albeit imperfect, of Canada's performance in this regard. Canada ranks in the lowest tier of developed nations in terms of patents secured per capita (see Figure 6.20).

Figure 6.20

PATENTS SECURED PER 100,000 INHABITANTS, 1987



SOURCE: IMD WORLD COMPETITIVENESS REPORT, 1990

Many would argue that the rate at which new technologies are adopted by industry is as important as the rate of invention. IMD/World Economic Forum's Survey of Business Executives ranks Canada last among major OECD nations in the "efficiency of companies in seeking new technologies and commercially exploiting them."[110] Canada generally lags behind other industrial countries in the speed with which it adopts new technologies and production processes. A survey of Canadian manufacturers by Statistics Canada in 1987 revealed that less than half employed at least one of a comprehensive list of advanced manufacturing technologies, ranging from computer-aided design methods to sensor-based inspection practices. Moreover, less than a third intended to do so in the next two to five years.[111] Even among those firms that do invest in new technologies, a study recently completed for the federal government suggested that efficiency and effectiveness gains are frequently diminished by the piecemeal fashion in which Canadian firms tend to purchase and incorporate those technologies.[112]

Industries characterized by slow technology adoption frequently have broader competitive difficulties. A deteriorating industry structure has contributed to the slow adoption of packaging technology in the whisky industry, for example. Traditionally unsophisticated demand conditions have discouraged investment in technology by Canadian automotive parts suppliers. Government policies that discourage plant rationalization have slowed the pace of automation in the Atlantic fish processing industry. And an abundance of high-quality, low-cost basic factors has minimized pressures for Canadian pulp producers to upgrade mills.

Those industries that have invested in leading-edge technologies have often done so in response to current or anticipated competitive pressures. The need to contain costs and enhance productivity as new low-cost competitors came on stream led to the development and adoption of vertical retreat mining technologies in the nickel industry. Demanding customers created a strong impetus for the telecommunications industry to develop feature-rich equipment. In the life insurance industry, new technologies are typically adopted in anticipation of rivalry-induced product enhancements.

i) Intellectual Property Rights

Intellectual Property (IP) and patent legislation can have a significant impact on the rate at which new technologies are created and adopted. IP law must balance the need to protect the owners of intellectual property with the importance of diffusing technology broadly and quickly. This balance is crucial. While it is necessary to encourage and reward research and development by providing adequate patent protection, long patent lives and broad copyright protection can also impede the process of creating new inventions by slowing down the diffusion of available technology.[113]

Canada is a net importer of technology, and the country's IP laws have therefore provided less extensive IP protection to innovators than those of several other advanced nations. In part this reflected a desire to encourage more rapid technology diffusion throughout the economy. In the past, this prompted strong objections from R&D-intensive industries such as pharmaceuticals. Pharmaceutical companies objected to weak IP protection, and also complained that they were forced to grant licenses to Canadian generic drug companies at royalty rates lower than otherwise attainable through direct negotiation.[114]

Not surprisingly, compulsory licensing adversely affected the willingness of pharmaceutical companies to invest in developing proprietary product technologies for the Canadian marketplace. Recently, a compromise position was negotiated. With the passage of Bill C-22 in 1987, patent-holding drug companies obtained seven to ten years of market exclusivity from the date of product approval. This period was roughly comparable to international standards at the time. In return for increased patent protection, drug company members of the Pharmaceutical Manufacturers Association of Canada agreed to approximately double R&D expenditures as a percent of Canadian sales by 1996. This objective has already been achieved. However, this advance in IP protection has already been eclipsed by the U.S. and several European nations, which have since extended or are extending protection to 14 and 15 years.

Revisions to the Patent Act also brought Canada's patenting system in line with other OECD countries -- apart from the U.S. -- by shifting from a first-to-invent, to a first-to-file basis. This effectively ensured that applications for patents would be made public 18 months after being filed, in most cases before the actual patent is issued. In so doing, the government hoped that earlier access to information bearing on inventions would facilitate technology diffusion. As well, 1988 amendments to Canada's copyright law extended copyright protection to computer software, in accordance with what has become standard international practice.[115]

A number of IP challenges remain to be addressed. In the area of IP protection, concerns exist regarding the speed and adaptability with which legislation can cope with patenting new technologies and new life forms. To deal more effectively with the reality of rapidly changing technologies, some industry associations are urging the creation of "petty patents" to protect inventions that can become obsolete long before the expiry of patent protection. Such a mechanism has been adopted in Germany.

Second, concerns have also been expressed about the utilization of IP laws by small and medium-sized firms. In a recent survey, for example, 60 percent of companies with sales above $25 million used three or more IP statutes, as did 29 percent of companies with sales between $1-25 million; while the corresponding figure for companies with less than one million in sales was just 17 percent.[116] The high cost and length of time required to prosecute IP infringements have prompted some small and medium-sized firms to abandon efforts to obtain adequate IP protection.

Third, IP rights have become an increasingly important trade policy issue and now figure prominently in international discussions concerning innovation and competition policy. Negotiations on trade-related aspects of intellectual property are now firmly on the agenda of the GATT, where industrial countries are seeking to strengthen IP protection. New GATT agreements affecting IP are likely to emerge at the conclusion of the current Uruguay Round. Work on patent and other IP law harmonization is underway at the World Intellectual Property Rights Organization (WIPRO). The subject of IP is also central to the OECD's current work on science and technology policy and competition policy. The growing importance of IP issues at the international level requires that the Canadian government give an increasingly high priority to defining and pursuing Canada's interests in this field.

At a time of uncertainty about the future division of powers between the federal and the provincial governments, it is noteworthy that IP rights -- including patents, trademarks, copyright and industrial design -- fall clearly under federal responsibility. In other areas related to science and technology, such as higher education, research policy, and industrial support, jurisdiction is either mainly provincial or else is shared between the two levels of government. IP rights are, therefore, a critical federal lever in influencing science and technology policy in Canada.

To spur technology diffusion, it is important that an administrative infrastructure be put in place to ensure that patent information is made widely accessible. At present, Canada lags behind several of its international competitors in the automation of patent search processes. As a result, accessing patent information tends to be cumbersome and time-consuming. It is estimated that automation of the operations of the Patent Office will take five years and cost $65 million. Without this system, it will be difficult for Canadian firms both to access patent information available in Canada and to link up with a global patent information database on which the U.S., Europe and Japan are presently investing $1.5 billion. Completing the automation program should, therefore, be a priority.

ii) Collaborative Links Not Well Developed

The successful commercialization and diffusion of new technologies is highly dependent upon the existence of strong links between the publicly-funded research community (that is, universities and government) and industry. The cooperative work undertaken by Petro Canada and CANMET on developing lighter crude oil products through sophisticated hydro-cracking technology serves as an example. However, despite a few successes, these links are generally not well developed in Canada.

Collaborative efforts between industry and government have historically been inhibited by a variety of institutional factors ranging from restrictive ownership rights for government researchers to cumbersome legal procedures for technology transfer. These will be discussed below in the Government Policy section.

Links between universities and industry have been weak, although there have been some positive developments in recent years. While the use of contract research within universities has been increasing, the absolute level of research funds channelled to universities by the private sector is still only half of the amount provided by the federal granting councils. Moreover, industry accounts for only about ten percent of universities' total contracted research; most originates with non-profit foundations.

Although our industry studies revealed several examples of positive working relationships between industry and universities, most seem to have emerged because of the persistence of an individual "champion" committed to a particular project, not because of a successful marriage of institutional interests. In many cases, these positive initiatives have spawned entrepreneurial undertakings. Examples of firms spun off from university research efforts were found in both the biopharmaceutical industry and in geophysical contracting. In biopharmaceuticals, Connaught Labs, IAF Biochem, and Quadra Logic all had their beginnings in a university setting and were closely associated with a single or small group of professors. In the geophysical contracting industry, research funded by Cominco at the University of Toronto into new airborne electro-magnetic techniques led to the establishment of Lamontagne Geophysics, now an important supplier to Inco.

Universities, on the whole, are not perceived as very receptive to overtures by industry. Only two years ago, Canstar, a leading Canadian manufacturer of ice skates, had to turn to an American university for collaboration in the development of a new figure skate technology after the firm's proposal was rejected by several Canadian universities. RH Institute, a Winnipeg-based producer of vaccines, told a similar story. Its initiatives to build a research facility on the University of Manitoba's campus were rebuffed by the university's administration. RH Institute claims that the university saw its proposal as a real estate transaction rather than a collaborative venture.

5. CAPITAL RESOURCES

Capital resources are an important component of a nation's factor conditions. The availability and cost of capital have a considerable impact on the competitive position of a nation's industries. To encourage constant upgrading of an economy, sufficient capital must be available to firms at a reasonable cost, and that capital must also be efficiently allocated to investments with the highest productivity. A low cost of capital tends to encourage the high and sustained levels of investment necessary to enhance productivity. Access to capital is also critical to the ability of emerging companies to fund growth and pursue competitive advantage.

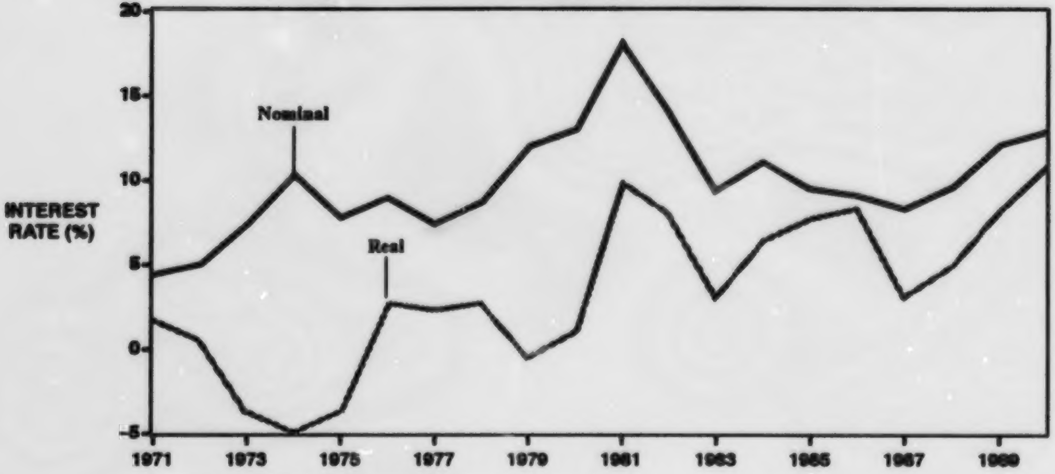
By international standards, Canada's capital market and financial system are highly developed. Canada has the world's fourth largest organized public capital market, with five active securities exchanges. It also has a diversified network of financial institutions, including a nationally regulated system of chartered banks, numerous trust companies, a burgeoning credit union sector, a small venture capital industry, a host of insurance companies and investment dealers, and a range of government programs and institutions designed to facilitate business's efforts to secure capital. Private pension fund assets total more than $180 billion and are rising by some $15 billion each year. Venture capital funds amount to a modest $3.3 billion. Banks have the largest presence in the financial marketplace, holding about half of all financial institution assets, following by life insurance companies (13 percent), trust companies (8 percent) and credit unions (7 percent).[117]

Although the Canadian financial system is sophisticated and diversified, gaining access to capital at a reasonable price is seen as a constraint to growth and upgrading by many knowledgeable Canadian observers. The following section focuses on two main issues: cost of capital and access to capital.

A. Cost of Capital

Increases in short-term interest rates in the later half of the 1980s (see Figure 6.21) have led many to suggest that Canadian firms are at a disadvantage relative to their competitors in other nations because of higher financing costs. The situation is more complex than this, however. The true cost of capital is a function of the cost of debt (adjusted for inflation and measured on an after-tax basis), the cost of equity, and the degree of leverage in the economy (total debt as a percentage of total debt plus equity). Interestingly, Canada has a lower debt/equity ratio than the U.S., Japan, the U.K, or Germany.[118]

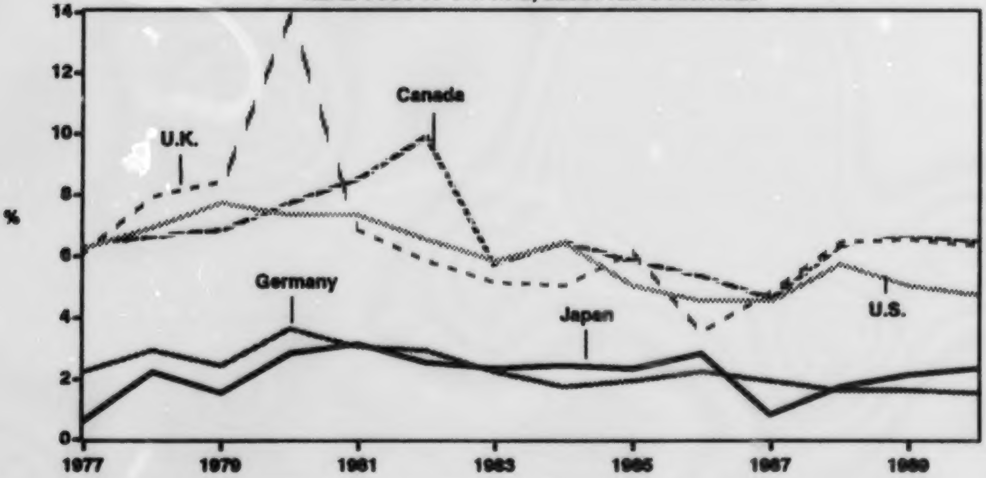
Figure 6.21
CANADIAN SHORT-TERM INTEREST RATES, REAL AND NOMINAL



SOURCE: THE QUARTERLY ECONOMIC REVIEW, MARCH, 1991

However, while financing costs in Canada are similar to those in the U.S. and the U.K., all three of these countries have a cost of capital substantially higher than either Germany or Japan (see Figure 6.22). This has held true over many years, and suggests that firms sourcing financing in Canada, the U.S. or the U.K. must deliver a higher rate of return to investors than those in Germany or Japan.119

Figure 6.22
REAL COST OF CAPITAL, SELECTED COUNTRIES



SOURCE: THE QUARTERLY ECONOMIC REVIEW, MARCH, 1991

The fact that Germany, Japan and some smaller OECD nations such as Switzerland have enjoyed lower financing costs than Canada is directly linked to their superior inflation records over an extended period of time. In a global capital market characterized by progressively fewer controls or restrictions on the movement of funds, each nation has its own economy-wide risk premium which is built into its interest rate structure. These risk premiums reflect domestic and international investors' perceptions of government policies, macroeconomic stability, and national economic prospects, and tend to be highly correlated with trends in inflation. Germany and Japan have enjoyed a lower cost of capital than Canada (as well as the U.S. and the U.K.) largely because they have had more stable macroeconomic policies and lower inflation. They are perceived by financial markets as carrying a smaller risk of future inflation than countries such as Canada, which have experienced higher and more erratic inflation rates.

While the rise in financing costs in Canada relative to the U.S. since 1988 may be a short-term phenomenon, if it does mark the beginning of a more fundamental trend then the repercussions for Canadian industry will be serious. This recent divergence in Canada-U.S. financing costs may be partly attributable to the level of aggregate public sector debt in Canada, which substantially exceeds the consolidated government sector debt in the U.S. as a proportion of GDP. In combination with an inflation rate historically higher than that in the U.S., Canada's rise in government indebtedness may well have increased the required rate of return demanded by investors.[120] To prevent Canada's recent competitive disadvantage in the cost of capital from becoming permanent, policies aimed at achieving lower and more stable inflation as well as a steadily declining government debt/GDP ratio will have to be aggressively pursued.

The relatively high cost of capital in Canada has implications for company goals and the planning horizons of both managers and investors. High real interest rates increase the attractiveness of investments in short-term, risk-free securities such as government treasury bills, and raise the "hurdle rate" for capital investment projects in companies. High capital costs can deter investments needed to achieve and sustain long-term competitive advantage. They encourage a preoccupation with short-term performance strategies on the part of business managers, which are less conducive to developing competitive advantage.

B. Access to Capital

Studies conducted by the Canadian Chamber of Commerce, the Canadian Federation of Independent Business, Venture Economics, and the NABST have all cited access to capital as a factor limiting the development and growth of small and medium-sized firms. These reports have identified issues related to both debt and equity financing.

Debt: Canada's major chartered banks are the principal source of debt for new ventures in Canada. While the banks provide approximately 70 percent of funding for small and medium-sized businesses (according to the Conference Board of Canada), many Canadian entrepreneurs complain that the banks are too risk averse. An example is the banks' tendency to require higher personal guarantees for firms with few tangible assets. Studies conducted by researchers at the University of Western Ontario found that startup firms had to provide collateral coverage roughly 2.8 times higher than that required of larger firms, even after controlling for business risk factors.[121]

A report recently released by the National Advisory Board on Science and Technology (NABST) echoed this theme. It concluded that investors/lenders were less experienced in evaluating "soft asset" financing opportunities (that is knowledge- and technology-based startups) than other types of opportunities. Lack of familiarity with the nature of these businesses made it difficult for them to judge appropriately the inherent risk of the ventures, effectively limiting the availability of capital.

A study comparing Canadian banking practices with those in the U.S. and select European countries concluded that Canadian bankers had relatively less formal training in commercial credit and less exposure to financial statement analysis, thus impairing their ability to assess new business opportunities. The same study also found that the credit-granting policies of Canadian banks discourage risk-taking on the part of lending officers. This was compounded by the frequent turnover of loans officers, who seldom managed an account for more than two years.[122]

Through the Federal Business Development Bank (FBDB) and the Small Business Loans Act (SBLA), the federal government is actively involved in providing debt financing to small and mid-sized companies. FBDB is an active participant in the business term loan market, accounting for eight percent of all term loans under $1 million, and for 6.4 percent of those under $5 million in 1989. Approximately half of its loans are to companies that have been in business for fewer than five years; more than half are for amounts under $100,000. Currently, the FBDB has outstanding loans of almost $3 billion to some 15,000 business customers. Under the SBLA, the federal government provides guarantees -- up to 85 percent of the value of loan losses -- to financial institutions that make loans of up to $100,000 to companies for the purchase of capital assets. SBLA-backed loans have been running in the range of $600-700 million annually, with total loan guarantees outstanding in excess of $1.5 billion. Together, direct FBDB loans and loans backed by the SBLA represented about one-eighth of all business loans under $200,000 in 1989-90. Most provincial governments also have programs to assist small and mid-sized companies to access debt capital.

The federal government also provides tax incentives to form investment vehicles that channel funds into small business (Small Business Investment Corporations). In particular, these allow institutions participating in SBICs to invest $3 in foreign securities for every $1 invested in SBIC. This measure is intended to encourage institutions such as pension funds, that wish to diversify their holdings beyond Canada (but face legal restrictions on their ability to do so), to invest in small domestic companies. However, studies suggest that the policy has not had much impact.[123] Over three-quarters of fund managers interviewed in one study said the incentives had no influence on their investment decisions. Other important federal tax incentives include the $500,000 lifetime capital gains exemption for qualified small businesses.

Provincial governments are also actively involved in helping small and medium-sized businesses access capital through programs that range from loan guarantees to venture capital provision to business counselling. Many of these programs appear to be quite successful. Ontario's New Venture Program, for example, has provided over

18,000 loans to SMEs, with a failure rate of only 14 percent. Approximately 60,000 jobs have been created through the program. In Nova Scotia, the Small Business Development Program provides loans to start up companies; 80 percent of those receiving grants are still in operation after three years. PEI's Small Business Enhancement Program has helped develop successful new products or services for over 70 percent of applicant firms.[124]

Equity: The National Advisory Board on Science and Technology recently noted that "access to capital, whether for start-up or expansion, is the primary financing issue for new or emerging technology firms."[125] It is also a relevant issue for small firms in general. The financing problem in Canada is most acute in the case of equity capital. There are a variety of ways in which Canadian firms are funded with equity. In addition to owner's equity and retained earnings, equity is also available from the external marketplace. There are three principal segments:

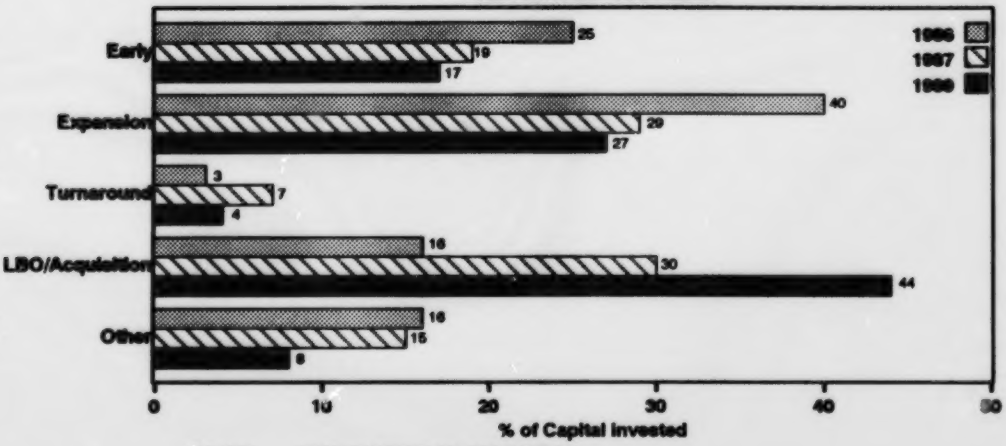
- The "informal market," consisting of networks of wealthy individuals willing to invest in start-up and early-stage companies;
- The private institutional segment, including venture capital funds, pension funds, private placements, and merchant banking firms; and
- Organized securities exchanges, to which companies can turn to raise capital by issuing publicly traded shares.

There is little evidence that large Canadian companies have difficulty raising equity capital (or other funds) for business expansion. But businesses in "non-traditional" sectors (high technology and knowledge intensive industries), as well as smaller companies in general, face greater problems. A survey of technology companies by the Premier's Council of Ontario, for example, found that lack of equity financing was the most frequently cited constraint to firm growth.[126]

Venture capital is a promising source of equity finance for many small and fast-growing firms. As in the U.S., however, Canadian venture capitalists have been shifting away from startup and early stage financing. Figure 6.23 illustrates this trend. Early stage financings attracted only 17 percent of venture capital funding in 1989. The rise in LBO/Acquisition funding is due in part to the negative experiences of venture capital companies involved in backing startups in the early 1980s. In an effort to ensure greater security on their return, venture capitalists increasingly have been restricting their investments to companies with more established track records.

Figure 6.23

VENTURE CAPITAL INVESTMENT BY STAGE OF INDUSTRY DEVELOPMENT



SOURCE: VENTURE ECONOMICS, ACVCC CANADA

Greater risk aversity among venture capitalists in Canada has limited the ability of early stage firms to access external sources of equity capital. A Venture Economics study found that Canadian venture capitalists discounted first year projected sales and profits by entrepreneurs by 48 percent and 75 percent, respectively, compared to only eight percent and 17 percent for U.S. venture capitalists.[127] While a higher discount rate in Canada may well make eminent sense based on past experience, it is difficult to believe that the gap between Canadian and U.S. discount rates is fully warranted by the relative performance of entrepreneurs who have obtained venture capital investments in the two countries.

Inadequate funds for startup and early stage firms impose particular constraints on entrepreneurs and fast-growing firms in "soft-asset" industries. Increasingly, they must rely on personal capital or the public sector. In fact, provincial and federal Crown corporations now account for more than 60 percent of total venture funds in the early stage category.[128] The Federal Business Development Bank, for example, has a venture capital division. Ontario and Quebec also provide significant venture capital funds (for example, $350 million over five years in Quebec) to support the development of technological innovations not being funded by the private sector.

However, the inability of most public sector agencies to provide follow-on funding is sometimes cited as a weakness of government capital provision. Overall difficulties in obtaining follow-on funding -- whatever the source -- may explain why almost half of new businesses in Canada do not survive beyond three years.[129]

For most of Canada's larger firms, capital can be readily sourced domestically or on foreign markets -- and at a cost that is roughly comparable to that of U.S. and U.K. companies. Smaller firms, including those in knowledge-intensive industries, are not so lucky. The evolution and small size of Canada's venture capital market, and the difficulties that many small early stage firms face in obtaining equity capital, point to gaps in the adequacy of Canada's capital resources and financial system. Over time, the lack of a vibrant earlystage venture capital market is likely to limit the growth potential of knowledge industries in particular. Difficulty in accessing capital limits the ability of firms to upgrade technologies or establish new ventures. As a result, it serves to weaken dynamism in the economy as a whole.

6. SELECTIVE FACTOR DISADVANTAGES

An important finding of the ten-nation study is that in some instances, competitive advantage can actually grow out of factor disadvantages. In the traditional model of international competition, competitive advantage results from factor abundance. In actual competition, however, disadvantages in basic factors -- such as labour shortages, a lack of domestic raw materials, high currency values, or a harsh climate -- can create pressure to adapt and often lead an industry toward important technological innovations.

In northern Italy, for example, steel producers developed highly efficient mini mills that use scrap as feedstock. These new designs helped the local firms to overcome high capital costs, high energy costs and a lack of local raw materials. In striving to overcome these selective factor disadvantages, northern Italian steel firms are reputed to have achieved among the world's lowest production costs. Other notable examples in the ten-nation study of factor disadvantages helping to create competitive advantage were found in Japan and Sweden. In Japan the very high cost of land has led to innovations in the manufacturing process (for example, just-in-time inventory management) which have not only helped to drastically reduce factory space but operating costs as well. Swedish firms have become world leaders in the development of prefabricated housing designs that are efficient to construct because of a short building season and very high wages for construction workers.

Canada's severe climatic conditions have frequently spurred innovation. For example, Canadian firms and researchers have developed wheat strains suitable to extreme conditions and a shorter growing season; insulated tubing for oilwell servicing fluid; effective insulation for prefabricated and mobile homes; and electric power transmission systems able to withstand Arctic temperatures. The vastness of the Canadian landscape has also played a role in inspiring product development. Electric power high-density transmission systems emerged as a consequence of long distances between load markets and hydro plants. In telecommunications, Canada pioneered the development of tropospheric transmission systems that allowed for low cost service in the isolated regions of the eastern Arctic by bouncing radio signals off a layer of the atmosphere. Finally, the unusual quality of certain mineral deposits has also contributed to the development of competitive Canadian industries. For example, Canada developed the technology for a unique process of refining high sulphur-content ("sour") gas that has since been successfully applied to several projects overseas. Much of Canada's industrial explosives industry is geared to developing explosives combinations that will enhance ore extraction from difficult geological formations.

In the industries surveyed during this study, relatively few examples were found of product or process innovations resulting from factor disadvantages in areas other than physical resources. Instead, there seems to be a tendency for Canadian industries to view governments as having a responsibility to help them overcome factor disadvantages that emerge. Central Canadian manufacturers' demand for subsidized energy in the face of the oil shocks in the 1970s is one example. Canada's use of immigration to fill occupational shortages -- as an alternative to investing in training indigenous workers -- can be seen as another example.

An exception to this tendency is the Canadian nickel industry's development of bulk mining techniques as part of its effort to boost productivity during a time of severe market downturns in the early 1980s. At the time, nickel producers in most competing nations (especially developing countries) were being directly supported by government funding. Canadian producers, however, were not in this position, and so faced more intense pressures to innovate. Canadian wage rates were also significantly higher than those of competing nations, in part due to the labour intensity of sulphide mining operations as well as to the high cost of the non-wage provisions of the industry's collective bargaining agreements. As a result of these pressures and constraints, the industry invested heavily in mining and processing technologies that succeeded in sharply reducing unit labour costs and increasing productivity.

It is important to note that the inability of many Canadian firms to seek competitive advantage in the face of factor disadvantages may often be a function of weaknesses in other elements of the diamond. The ten-nation study clearly indicated that selective factor disadvantages will not lead to innovation if they are not supported by other determinants, because the forces leading to the upgrading of competitive advantage act as an interdependent system.

7. GOVERNMENT'S EFFECT ON FACTOR CONDITIONS

The potential rate of upgrading in an economy is set by the rate at which the quality and quantity of factors improve. Government policy often has an important role in this process. Several examples of the impact of government policies have already been cited in the chapter. This section covers a number of areas of government policy that have influenced Canadian factor conditions. The discussion of government policies is selective and is intended to be illustrative rather than comprehensive.

A. Policies Toward Factor and Currency Markets

i) Exchange Rates

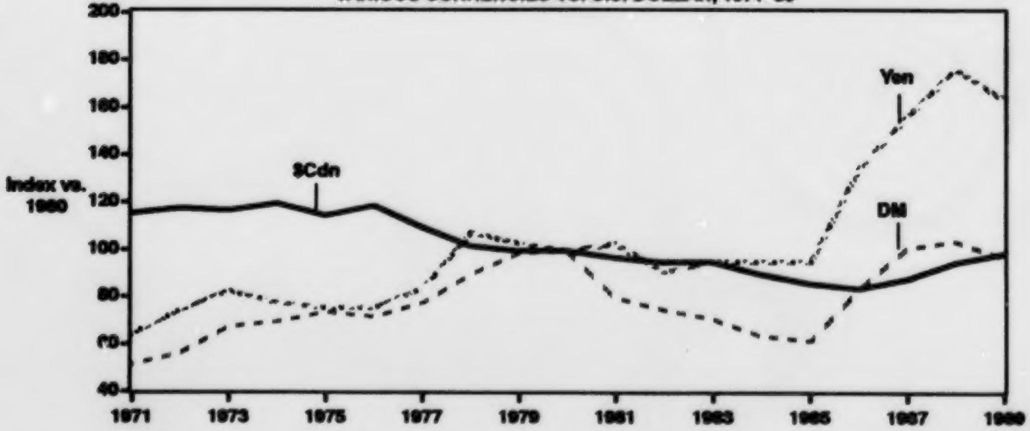
Concern over the value of the Canadian dollar has dominated much of the recent discussion surrounding Canadian competitiveness. Many observers have argued that a high Canadian dollar hurts Canada's competitive position, especially the ability of Canadian firms to penetrate the U.S. market. Research from the ten-nation study, however, suggests that currency values have little impact on the underlying competitiveness of a nation's industries. In fact, an appreciating currency can serve to pressure firms to upgrade their competitive position -- for example, to move into higher value products and segments -- and to innovate. Nations such as Germany, which experienced a sharply rising currency in the mid-1980s, actually strengthened competitive advantage in several of the industries examined in the ten-nation study.

Another finding was that intervention in currency markets can remove pressures for innovation and upgrading. Instead of improving quality or lowering production costs, a depreciating currency can tempt firms to delay critical restructuring and collect short-term profits -- a pattern seen in the U.S. auto industry in the mid-1980s. Clearly, however, a balance must be struck. Currency pressures should be strong enough to promote upgrading, but not so great as to impair the long-run capacity of a nation's industries to compete.

The Canadian dollar has floated freely against other international currencies since 1972. Interest rates set by the Bank of Canada have been driven primarily by domestic inflation control objectives, not exchange rate targeting. As a result, the value of the Canadian dollar has fluctuated considerably, ranging from roughly US$0.70 to US$1.02 over the past two decades. On average, however, the Canadian dollar has been much less volatile in its movements against the U.S. dollar than either the German mark or the Japanese yen (see Figure 6.24). Since 1985, for example, the yen has appreciated far more against the U.S. dollar than the Canadian dollar has -- rising more than 86 percent, versus a more modest increase of approximately 22 percent in the case of Canada's dollar.

Figure 6.24

VARIOUS CURRENCIES VS. U.S. DOLLAR, 1971-89



SOURCE: BANK OF CANADA REVIEW, OECD

In fact, over the period 1960 to 1989 Canada's nominal currency value has tended to track quite closely the purchasing power parity (PPP) exchange rate often used by economists as a proxy for the "true" value of a currency. While the exchange rate in 1991 is clearly overvalued versus PPP, the difference is small (approximately eight to ten percent). On the other hand, from 1984 to 1987 the Canadian dollar was undervalued by up to ten percent based on PPP estimates.[130] Current estimates put the Canadian dollar's PPP value at 79–82 U.S.¢.

While appreciation of the dollar above its current level is certainly not desirable, and a gradual decline to its PPP value should not be resisted, aggressive intervention to devalue the dollar would provide Canadian industries with only short-term relief and not address their more fundamental competitiveness problems. Moreover, a policy of deliberate currency devaluation can trigger a vicious circle, as a falling currency leads to rising import prices, higher inflation and wage costs, and declining competitiveness. The preferred way to bring the Canadian dollar closer to its "true" rate of exchange is through better fiscal management, lower government deficits, increased domestic savings, and less foreign borrowing -- all of which would pave the way to lower nominal and real interest rates.

In the meantime, rather than concentrating on the exchange rate, Canadian firms would be better advised to take steps that will allow them to be cost competitive at exchange rate levels that are comparable to or even higher than today's. Looking back longingly to the days of a 72 cent dollar does nothing to improve competitiveness.

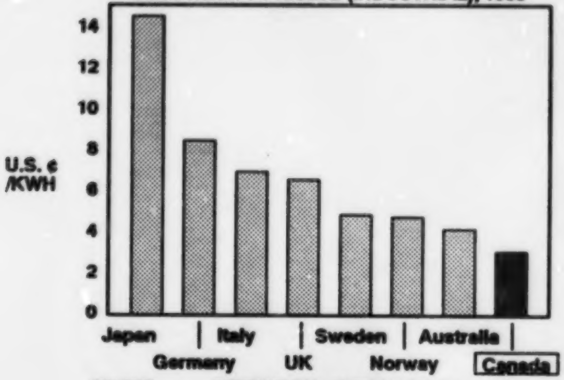
ii) Input Prices

The ten-nation study found that competitive advantage was often upgraded when a nation's domestic input costs moved somewhat in advance of those in other nations; this can give firms early warning of trends that will affect international competition and encourage them to upgrade ahead of rivals in other countries. Governments should avoid the temptation to hold down input prices artificially in a bid to improve the short-term competitive position of domestic industries, since this is likely to have negative consequences for competitiveness over the longer term.

Governments at various levels in Canada have sometimes yielded to pressures to artificially restrain input costs. They have employed both implicit and explicit methods to reduce such costs. Transportation subsidies have featured prominently in Canadian public policy, as government has attempted to overcome the cost of shipping goods from outlying provinces to central Canada, or of exporting grain from the Prairies. Following the oil shocks of the 1970s, the federal government introduced a differential pricing policy, with the express purpose of holding Canadian petroleum prices below world market levels in order to strengthen the competitive position of Canadian manufacturing.

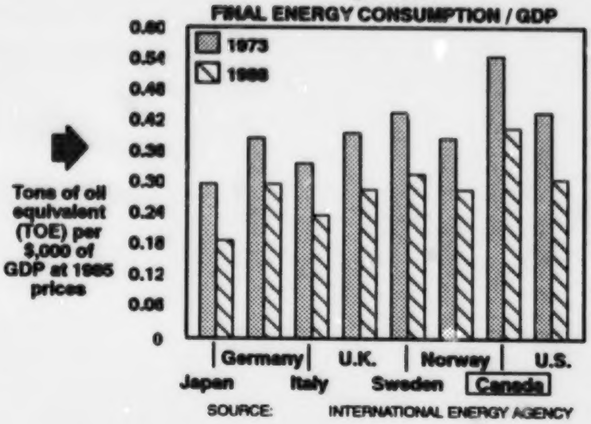
Provincial electrical utilities have long benefited from a variety of advantages that allow them to keep prices low: as Crown corporations, they are exempt from corporate income tax; government guarantees ensure a lower cost of debt; and lucrative export sales have been used to subsidize domestic rates. Such policies have had a predictable impact on Canadian consumption behaviour. As Figures 6.25 and 6.26 illustrate, there is a strong positive correlation between electricity prices and final energy consumption per unit of GDP in advanced industrial countries. With the lowest electricity prices of any G7 nation, Canada consumes substantially more energy per unit of output than most of its trading partners. In part, this may be due to Canada's high concentration of energy-intensive industries and its northern climate. However, Canadian consumption is high not only in absolute terms, but also relative to historical domestic consumption levels. In the post-1973 era, Canada -- like all other industrialized nations -- reduced energy consumption levels per unit of GDP; but Canadian consumption declines have been proportionately smaller than in all other G7 nations except Germany.

Figure 6.25
ELECTRICITY PRICING (INDUSTRIAL), 1988



SOURCE: INTERNATIONAL ENERGY AGENCY

Figure 6.26
FINAL ENERGY CONSUMPTION / GDP



SOURCE: INTERNATIONAL ENERGY AGENCY

Government-controlled inputs in the forest products sector provide another example. Canadian stumpage fees, regulated by the provincial governments, have been among the lowest in the industrialized world. These stumpage fees have yielded wood fibre costs that are roughly equivalent to those in the U.S. overall, but considerably lower than in Scandinavian countries.131 Relatively inexpensive inputs have encouraged a focus on lower-value commodity segments of the business. They have also allowed Canadian producers to get by with less efficient mill operations. The average age of pulping facilities in Canada is older than in any of its major competitors. As well, mill capacities are lower than in any other producing region outside of the western U.S. (see Figures 6.27 and 6.28).

Figure 6.27
WOOD FIBRE COST, BY REGION / COUNTRY, 1988

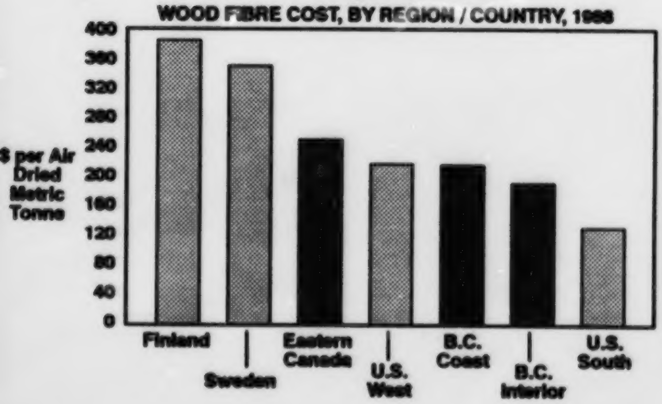


Figure 6.28
MILL UPGRADING, BY REGION/COUNTRY, 1988

	Fin-land	Sweden	East. Cdn.	U.S. West	B.C. Coast	B.C. Inter.	U.S. South
Average Age of Pulping Facilities (in years)	9	10	17	14	14	15	8
Average Daily Capacity Per Mill (000 tonnes)	1,050	1,216	[illegible]	782	817	[illegible]	1,265

SOURCE: PRICE WATERHOUSE, FOREST SECTOR ADVISORY COUNCIL

The Case of Agricultural Inputs: The agri-food sector provides an example of where government policy has worked against competitive advantage, not by subsidizing input costs, but rather by artificially increasing them to a level that seriously undermines the international competitive position of downstream industries. Virtually all industrial countries offer protection of some kind to many of their agricultural industries, and Canada is no exception. Under Canada's supply-management system, production and prices of chicken, turkey, eggs, and dairy products are carefully regulated. In addition, imports are strictly controlled, and in practice account for only a tiny proportion of domestic consumption of these commodities.

While this system has certainly benefited farmers, it has hurt Canadian food processors, particularly as tariffs have progressively been lowered. Processors must purchase these key inputs at prices determined by supply-management and marketing board agencies, rather than at prices set in the competitive market. Because Canadian input prices tend to be substantially higher than U.S. prices, food processors are placed at a competitive disadvantage relative to U.S. firms. It was estimated in 1989, for example, that wholesale prices for chicken in Canada were about 40 percent higher than in the U.S., while turkey prices were 38 percent higher.[132] Canadian-produced mozzarella cheese was priced 30 percent above the U.S. level. Higher prices for these key inputs translate directly into higher costs and prices for Canadian-produced processed food products.

Falling Canadian tariffs under the Canada-U.S. Free Trade Agreement pose a major challenge to Canadian food processors, because they mean that once-high tariffs will no longer be available to provide them with protection from U.S. competitors (although Canada's tariffs on most processed food products will not be fully removed until 1998). The result is a severe competitive squeeze for one of Canada's most important manufacturing industries. A solution to this problem is urgently needed if Canada is to retain a strong food processing sector. While intensive discussions on the competitiveness of the agri-food sector have been under way for some time among processors, growers, marketing board authorities, and the federal and provincial governments, progress has been slow. The most sensible long term solution may be to shift the form of support given to farmers from price- and supply-regulation to income stabilization and support. This would allow input prices to fall closer to U.S. levels, thus removing a major source of competitive disadvantage for the food processing industry.

B. Education and Training Policy

I) Lack of High Educational Standards

A nation's educational and training systems should demand high performance. In Canada, the development of rigorous educational standards has been impeded by two fundamental tenets of the Canadian system: decentralization and universal access.

At the elementary and secondary level, an emphasis on universality and the schools' broader social role has tended to encourage a lowest-common-denominator orientation, in which the primary goal seems to be to "get everyone through." Imparting basic knowledge -- which should be the most important objective of the schools -- has become less of a priority. Most provincial secondary school systems have eschewed a policy of academic streaming. The unfortunate consequence is that vocational and technically oriented programs frequently end up being used as the default stream for lower academic achievers.[133] This, in turn, reinforces the notion of vocational and technical training as "second best." At the postsecondary level, a policy emphasis on access has had the effect of discouraging functional specialization, as noted earlier in the chapter.

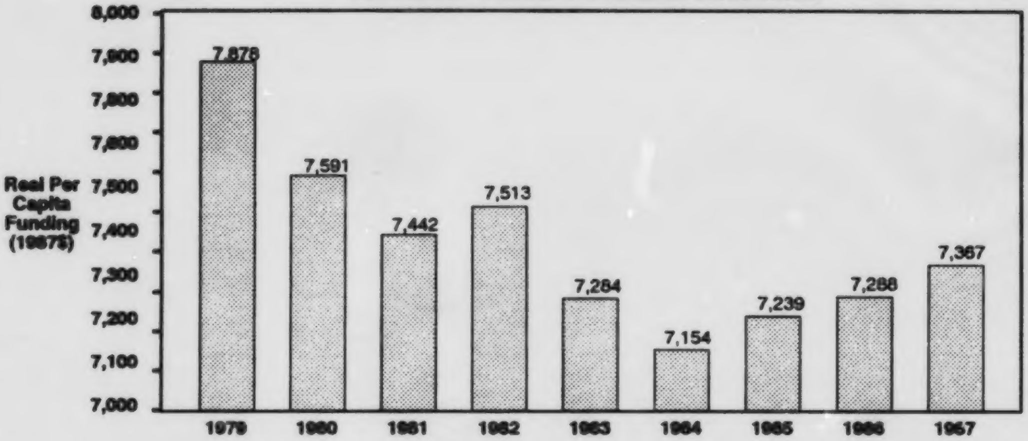
The highly decentralized nature of the Canadian educational system has made it difficult to establish standards. The federal government plays no role in elementary and secondary schooling; responsibility for both funding and administration of the public schools is shared between the provinces and local school boards. The only national coordinating body is the Council of Ministers of Education of Canada (CMEC), which so far has had little influence on policy determination or standards setting. In 1988, however, CMEC did secure the consensus necessary to launch a National School Achievement Indicators Project. Although the results of these tests would not be binding in any way, they would at least highlight areas of weakness within particular systems and general discrepancies in overall performance. Unfortunately, the project may be derailed after the Ontario government recently decided to withdraw, citing concerns over potential test biases.[134]

Better defined educational standards and more use of system-wide testing in order to establish benchmarks for quality and performance would help Canada to strengthen the basic skills and competencies of its youth. It is striking that apart from the U.S., Canada is virtually alone among major OECD countries in having no national educational standards of any kind. The lack of testing to benchmark and track performance in Canadian jurisdictions also contrasts with the situation in many other advanced nations. A national standard for testing need not require a full-fledged national system of testing -- an important distinction in Canada, since the provinces maintain jurisdictional prerogatives over education. In Germany, where the states are responsible for their own school curricula, mechanisms have been developed to ensure that both curricula as well as mandatory tests administered by the state education authorities are comparable across the country. There is no reason why a similar system could not be instituted in Canada. The decision by the Council of Ministers of Education to develop a series of national tests in cooperation with the provinces is a step in the right direction.

The administration of postsecondary education in Canada is also highly decentralized. The federal government is responsible for the largest proportion of funding for the system but plays no part in policy determination. (Ottawa does, however, have a strong influence over university research through the three federal granting councils, which together support a large proportion of all postsecondary research). What influence the federal government had by way of conditions attached to transfer payments was lost in 1977 when targeted funds were replaced under the Established Program Financing Act (EPF). Provincial governments are no longer obliged to disburse the entire amount of federal funds to the universities; in recent years many have chosen to divert a portion to unrelated programs. Partly as a consequence, absolute funding levels for post-secondary education declined in real dollars through the 1980s, while enrollment grew by close to three percent per year. Slower growth in federal EPF transfers to the provinces in the 1980s also played a role in financially squeezing the postsecondary system. The net result has been a substantial decline in real per capita funding (see Figure 6.29).

Figure 6.29

PER CAPITA FUNDING IN CANADIAN UNIVERSITIES



SOURCE: ASSOCIATION OF UNIVERSITIES AND COLLEGES OF CANADA

ii) Mixed Objectives of Labour Market Policy

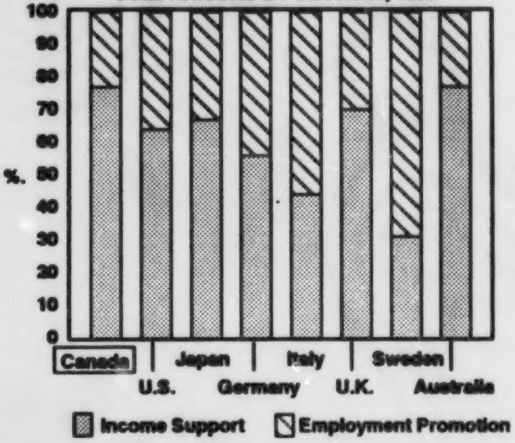
The overriding orientation of government labour market programming in Canada has been toward social policy goals, not improved industrial competitiveness. Roughly three-quarters of all government labour market expenditures in Canada (excluding education) is directed to passive measures, mainly income support in the form of Unemployment Insurance (UI) benefits. This proportion is significantly higher than in most other OECD nations (see Figure 6.30). Relatively little labour market funding has been channelled to active programs in the areas of training, retraining and job creation.

Employment promotion at the federal level falls under the Canadian Jobs Strategy. Total CJS program funding amounted to $1.8 billion in the 1989-90 fiscal year, 90 percent of which was directed to those who were currently unemployed.

In addition to the overwhelming focus on income support programs that is characteristic of Canadian labour market policy, the low proportion of the unemployed who receive any sort of training while out of work is of particular concern (see Figure 6.31).

Figure 6.30

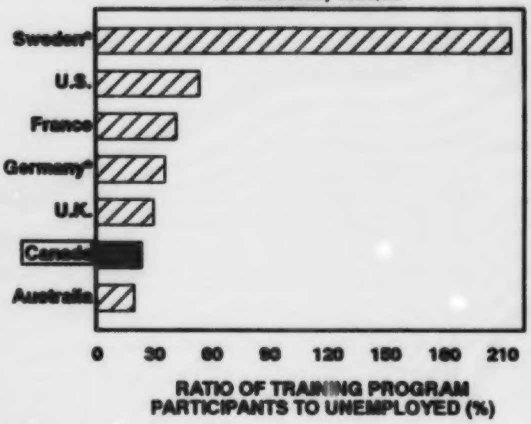
LABOUR MARKET EXPENDITURE COMPARISONS BY COUNTRY, 1988



SOURCE: OECD EMPLOYMENT OUTLOOK, JULY 1989

Figure 6.31

PARTICIPATION IN PUBLIC TRAINING PROGRAMS, 1988/89



* Figures are for 1987–88
SOURCE: OECD

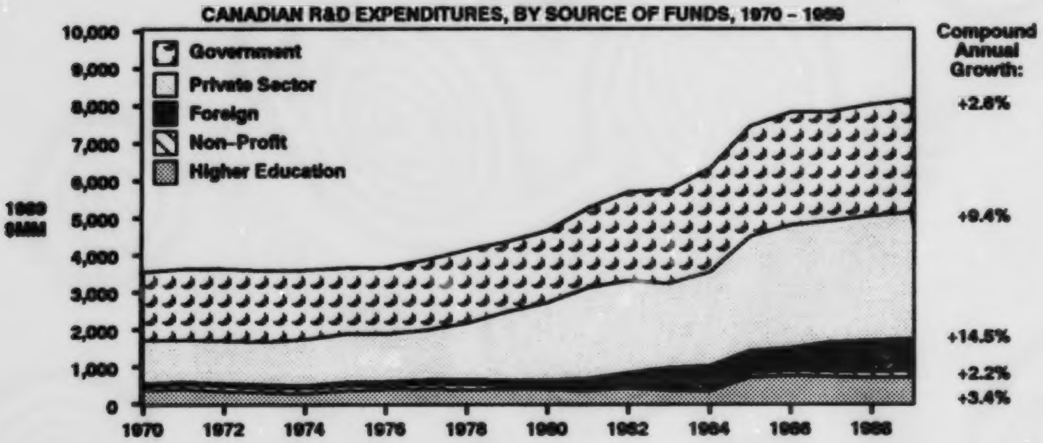
Initiatives recently announced as part of the federal government's new Labour Force Development Strategy (LFDS) have begun to shift the balance between passive and active measures. Federal funding for training programs was increased by $775 million per year. This was accomplished by redirecting funding made available through a tightening of UI eligibility rules. The redirected funds will be used to ensure that a larger proportion of UI recipients receive formal training while out of work. This should facilitate their transition back into the employed labour force. A stronger focus on training will enhance the flexibility of the labour force and spur upgrading of the economy.

An important component of the new federal labour market policy being pursued through the LFDS is the recent establishment of the Canadian Labour Force Development Board which, for the first time, will bring together representatives of business, labour, educators/trainers and government to establish program priorities for the allocation of federal expenditures for labour force development. The board also has a mandate to promote training in the private sector. Planning will be highly decentralized to encourage attention to local needs. Several provincial governments have announced plans to establish provincial training and adjustment boards within their own jurisdictions. Creation of a series of consultative and advisory institutions in the area of training and labour market policy attests to a growing recognition of the importance of human capital to competitiveness. A decentralized approach to training fits the realities of the Canadian labour market and may help to facilitate the process of geographic clustering in Canada. However, it will be important to ensure that the institutional structures and training programs of federal and provincial governments are carefully coordinated to minimize overlap and duplication, and to guard against the prospect of policy inconsistency and incoherence in an area increasingly important to Canada's competitiveness.

C. Science and Technology Policy

Government has played a central role in the development of Canada's science and technology resources. Historically, government has been the dominant source of R&D funds; only in 1980 did the private sector surpass government in its total investment in R&D (see Figure 6.32). The government itself -- particularly at the federal level -- has also been a major performer of R&D. Of the $2.7 billion spent by the federal government on R&D in 1990, 55 percent was performed by government laboratories, 27 percent by universities and 18 percent by industrial laboratories and non-profit research centres; of the $664 million spent by the provinces, the percentages were 41 percent (government laboratories), 46 percent (universities) and 13 percent (industrial laboratories/non-profit enterprises).135 Government's evolving role in R&D has been consistent with policy objectives that centred on the advancement of science and the training of highly qualified personnel; commercial relevance has often been a secondary consideration. In general, private sector participation in government R&D activities has not been well leveraged.

Figure 6.32
CANADIAN R&D EXPENDITURES, BY SOURCE OF FUNDS, 1970 - 1989



SOURCE: ISTC

Increasingly, however, governments in Canada have recognized that science and technology policies and priorities must be linked to industrial competitiveness considerations. Indeed, by 1990, federal science and technology organizations were involved in roughly 5,800 alliances with private sector participants. In addition, the need for the private sector to play a bigger role in determining spending priorities consistent with competitiveness has also been acknowledged.

A number of encouraging initiatives have been introduced over the past decade. For example, in 1987, the federal government established its Framework for Science and Technology which outlines basic principles for managing federal government science and technology activities. These principles include the objective that federally funded Science and Technology should be performed in the private sector and universities where appropriate and feasible, and that federal support for R&D should be used to lever increased contributions by industry and the provinces to raise the national level of R&D performance. However, the results to date have been mixed. Systemic barriers within the policy formulation framework itself appear to be preventing the fundamental changes needed to align government policy and spending with patterns of competitive advantage.

i) Historical Roots

Canada's commitment to publicly owned and operated research facilities is long-standing. Canada pioneered the development of government research laboratories in the 1870s with investments in agricultural research. Other laboratories or government agencies were established early on to facilitate the development of Canada's natural resources. The Geological Survey of Canada was established in 1842, and research laboratories managed by the federal department now known as Energy, Mines and Resources followed soon after. In 1916, the National Research Council (NRC) was created, principally to serve as a surrogate for a then poorly developed university research system.

Historically, these facilities have made valuable contributions to Canadian achievements in various scientific fields, as well as to the economic development of the nation. Government research and technical facilities were cited as a valuable resource by firms in several of the industries surveyed. CAE Electronics, for example, has engaged in co-operative research with the NRC's Low Speed Aerodynamics Lab. Both Boeing de Havilland and Canadair use NRC's Flight Research Lab. The geophysical software industry in Canada has benefited greatly from shadow mapping technology developed for the personal computer by the Geological Survey of Canada. The Department of the Environment's wastewater management laboratory in Burlington, Ontario, has developed several leading-edge technologies and helped to spawn a cluster of competitive firms specializing in the field. Finally, the Rockburst Research Program developed by the Department of Energy, Mines and Resources has been helpful in identifying and dealing with potential rockbursts in underground mines.

Some of the other industries surveyed, however, were more critical of government R&D practices and priorities, and particularly of their relevance to the current competitive environment. The dominant role of government has often excluded private sector input and direction, and may also have "crowded out" private sector activity -- for example, by competing for scarce, highly-skilled researchers. Moreover, mechanisms for transferring technologies from the public to the private sectors are not well developed.

In the groundfish industry, for example, several firms commented on the difference between the research efforts of the Canadian and Scandinavian governments. In both Norway and Sweden, private sector involvement in research is extensive, even though government funding is significant. The Norwegian Herring Industry Research Institute's budget is 75 percent funded by industry. Industry guidance in project selection is influential.[136] By contrast, Canadian fisheries research appears to have been government-driven, with little direction and support from industry. At the same time, "Canada's role in advancing the science and technology associated with the processing and distribution of fish has weakened . . . [the industry must therefore now increasingly] look abroad to acquire technical information needed to sustain fisheries development."[137]

Instances such as this have caused many in industry to question the nature and extent of government involvement in the direction of Canadian R&D activities. In the 1990s governments can no longer afford to view the advancement of science as an end in itself. As the link between industrial competitiveness and scientific and technological excellence tightens, the commercial relevance of activities has increased in importance; yet commercial relevance cannot be achieved without a high level of private sector participation and direction. Moreover, as the pace of technological change quickens, well-developed mechanisms for transferring technologies between those who perform R&D, and those who apply it to the needs of industry, are essential. In general, it would appear that there is significant potential to enhance the effectiveness of government laboratories in achieving these ends.

ii) Recent Initiatives

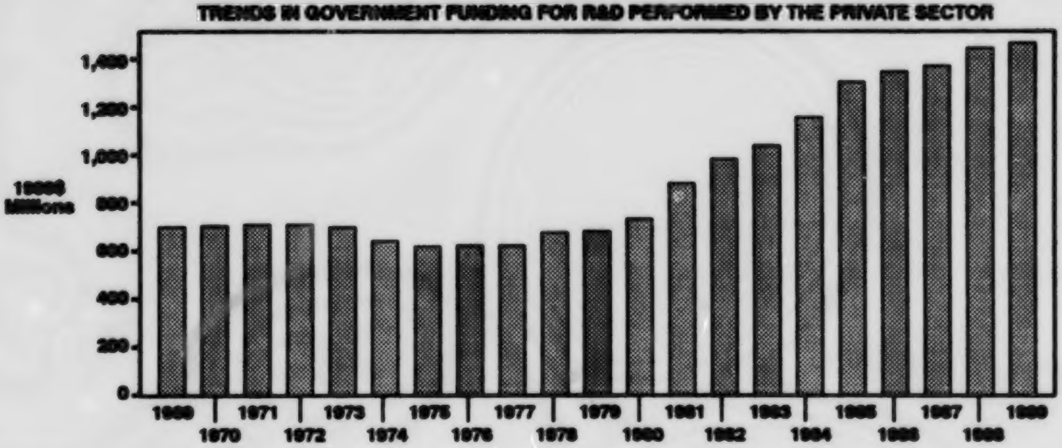
A number of recent government policy initiatives suggest a shift in priorities designed to heighten the commercial relevance of Canadian science and technology funding, and an intention to leverage private sector participation more effectively.

In the federal government's 1986 Speech from the Throne, a commitment was announced to ensure that "support for science, technology . . . is more clearly focused in the national interest."[138] Consistent with this commitment, the government appointed a National Advisory Board for Science and Technology, chaired by the Prime Minister. Shortly thereafter a new initiative, "InnovAction," was launched, marking the first comprehensive federal strategy for science and technology. At the heart of this strategy was an explicit commitment to "uniting science, technology and industrial competitiveness as the basis of Canada's future economic and social prosperity."[139] In 1987, the Prime Minister announced a plan to create a new Department of Industry, Science and Technology, to integrate science and technology objectives with industrial development objectives and to lend focus to the government's activities in these areas.

In the past several years, a number of new program initiatives have been introduced. Concurrently, there has been a marked increase in federal government's R&D expenditures directed to the support of private sector activity (see Figure 6.33). As a result, the private sector has replaced government as the largest performer of R&D in Canada. In addition, tax incentives for private sector R&D in Canada continue to be among the most generous in the industrialized world.[140]

Figure 6.33

TRENDS IN GOVERNMENT FUNDING FOR R&D PERFORMED BY THE PRIVATE SECTOR



SOURCE: ISTC

The intent of these recent science and technology initiatives has generally been sound. However, the specific programs and policies that have resulted have at times stopped short of the fundamental changes required to truly align science and technology policies with competitive advantage. Hard choices and decisive action have often been avoided, particularly in the implementation stages. As a result, the net impact of new initiatives has been disappointing in some cases.

Strong action has been inhibited by a number of conflicts inherent within the current policy framework. First, political considerations have sometimes resulted in multiple program objectives and a consequent lack of focus. Second, competitiveness considerations have not always been fully embraced. Third, resistance to change within the current system has often resulted in bureaucratic inertia: policymakers have tried unsuccessfully to apply old instruments to new ends. Finally, policy initiatives of the federal and provincial governments have not been well coordinated. These features will continue to limit the ease and speed with which science and technology policies will be able to adjust to the constantly shifting needs and priorities of Canadian competitiveness. Each is briefly considered below.

Blurred Objectives: The effectiveness of government spending on science and technology in Canada has been diminished by an absence of clear objectives. In many cases, blurred objectives can be traced to political considerations, particularly those related to regional equality and economic diversification.

Science and technology expenditure patterns have frequently been affected by regional development imperatives. As with most federal expenditures, an important objective is to ensure that federal funding of science and technology initiatives is distributed "fairly" across the country. Often, however, regional fairness does not translate into effective programs. When funds are spread thinly across all regions, there is a danger that the critical mass required to develop world-class research will be lost or eroded; there is also a potent risk that specialization will be discouraged. Canada is particularly vulnerable to such risks given limited government science and technology resources and the tremendous distances across which the nation's population and industrial capacity are scattered. The National Research Council, for example, has labs in almost all provinces, and until recently few had developed clear areas of specialization. In the early 1980s, the Department of Regional Industrial Expansion (DRIE) yielded to pressures to establish Microelectronics Centres in most provinces instead of concentrating its program funding for this field in one or two regions. As a consequence, the size of project grants for each centre proved inadequate, and all but two were forced to fold their operations within two years from startup. (The subsequent creation of the Technology Outreach Program is intended to avoid such problems by emphasizing support for specialized centres that build on regional strengths.)

Promotion of regional equality in science and technology funding has also militated against the geographic clustering of industries. If the Canadian Space Agency adheres to its mandate to "ensure that contracts are distributed fairly across the country," for example, it is unlikely that the agency will succeed in significantly enhancing the critical mass and specialized factor creation mechanisms of the core of companies in the existing aerospace cluster in Quebec.[141]

The federal government's Network of Centres of Excellence (NCE) initiative attempts to overcome regional impediments by encouraging researchers from different institutions to collaborate, often across great distances. The primary objective of the NCE program was "academic excellence." By this measure, the program may prove highly successful. The academic community has praised the program for its stability (grant commitments are guaranteed over a five-year period), and also for the open competitive process through which the grants were awarded. The benefits to Canadian industry are less clear. Competitiveness considerations appear to have had little impact on either the design or execution of the program, in spite of the fact that the traditional criterion of academic excellence was supplemented by "relevance to future industrial competitiveness" in defining the program's terms of reference.[142] Project selection, for example, was largely based on an academic peer review process. As a result, the NCE program's links with competitiveness appear weak, and private sector participation has been limited. With a few notable exceptions -- including a network headed by the Pulp and Paper Research Institute of Canada (Paprican) -- the research programs seem largely to have been determined by academic expertise, not industry-driven priorities. The networking emphasis seems to be inter-university, rather than industry-university. While furthering collaboration among researchers is a laudable objective, the emphasis on long-distance networking may work against development of a critical mass of expertise and discourage regional specialization.

Research and development funding has frequently been used as an instrument of economic diversification in Canada. Current spending patterns have been oriented to the development of new high tech capabilities rather than to reinforcing or strengthening inherent sources of advantage. In 1989, the federal government committed almost $300 million to space-related research. In the same year, less than $9 million was directed to lumber products, one of Canada's largest export industries. One observer recently summed up the paradox and its implications for Canada: "We can make a robotic arm for the U.S. space shuttle, but we have to import fishing trawlers from Europe and forest harvesting equipment from Scandinavia. And we haven't developed enough new resource products to fend off growing competition from South America, Asia, and now, the Soviet Union."[143] A further example of this lack of focus on core sources of advantage can be found in the federal government's recent decision to provide funding to the TRIUMF - Kaon factory, a research center that will use huge magnets to generate subatomic particles (kaons). The government has agreed to put up more than $230 million, despite substantial concerns raised by several scientific bodies -- including the Science Council of Canada and the National Advisory Board on Science and Technology -- about the efficacy of committing such a large amount of money to a single, basic research-driven project.[144]

The problem of multiple objectives also affects the federal government's programs of grants to industry at various levels. Of the roughly $300 million that the federal government awards annually in grants to the private sector for the purposes of R&D, more than 80 percent is tied to objectives other than pure R&D. Most federal grants for R&D are channelled through one of three programs: the Defence Industry Productivity Program (DIPP), regional development agencies, or the National Research Council's Industrial Research Assistance Program (IRAP). Of the three, only IRAP has technology development as its exclusive objective. Although both DIPP and the regional development programs include innovation components, eligibility is also dependent upon other criteria -- for example, the value of a given industry to the defence sector or to a particular region. Unfortunately, IRAP accounts for less than 15 percent of total grant spending; in 1988, DIPP and the Industrial & Regional Development Program (IRDP) accounted for 49 percent and 21 percent respectively of government R&D grants.[145]

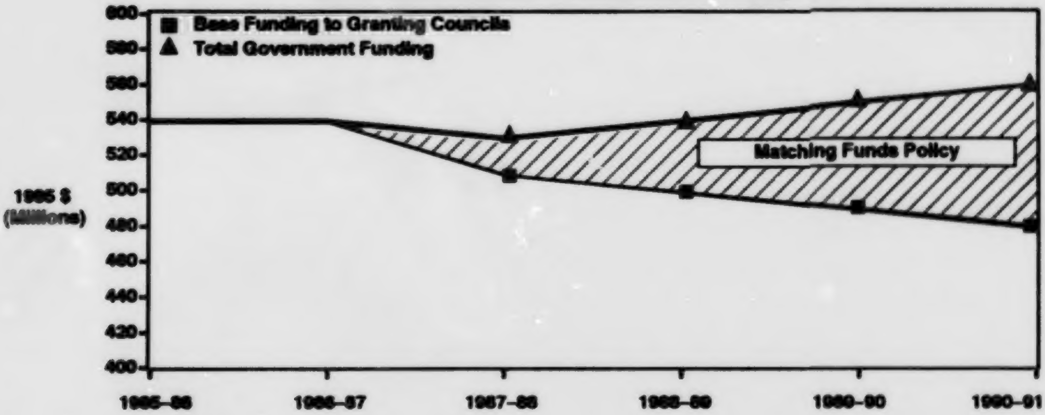
Resistance to Change: Stakeholders in the current system of government-funded R&D have, not surprisingly, resisted shifts in the balance of priorities. As a result, compromises have been made that have undermined the potential contribution of recent initiatives. Deficiencies in the federal government's Matching Funds Programs, for instance, stemmed in large part from the government's reliance on traditional vehicles for program delivery, notably the research granting councils, vehicles that may be inappropriate given the new program's objectives.

The objective of the Matching Funds policy was to enhance collaboration between university researchers and industry. Between 1986 and 1991 the government matched private sector contributions to university research with dollar-for-dollar increases to the base funding of the university granting councils, up to a ceiling of $380 million over the four-year period. All incremental funds went to the granting councils to be used at their discretion, not the participating university. As a result, there was no direct financial benefit to the university that attracted the matching funds, nor to private sector participants.

The objective of leveraging government contributions to the universities with private sector funding is a sound one. However, implementation did little to further this end. It did, however, serve to stabilize funding to the granting councils (see Figure 6.34) and to ensure their continued control over the distribution of project funding for higher education R&D. The government's reluctance to redefine the role of the granting councils as an intermediary between itself and the universities for the specific purposes of the program detracted from its effectiveness. As a result, the program has had little, if any, effect on the behaviour of university researchers or administrators. Nor did it stimulate incremental contributions to university research from the private sector.

Figure 6.34

GOVERNMENT FUNDING TO GRANTING COUNCILS, 1986–91*



* NOTE :Projected, assuming a 4.5% inflation rate.
SOURCE: "Strengthening the Private Sector/University Research Relationship: The Matching Policy Rules,"1986

Over the last several years, a variety of measures have been initiated in response to longstanding criticisms of the management of federal laboratories: the federal government's Canadian Patents and Developments Office, for example, has recently been dismantled, and a Technology Centres Policy was established to make "industry-oriented laboratories" more responsive to user needs. Emphasizing such operational issues, however, risks overlooking broader issues. At present, Canada does not have a comprehensive strategy for basic and applications-oriented research. The continued relevance of government laboratories has not been addressed, and insufficient effort has been made to integrate the responsibilities and capabilities of government laboratories with those of the universities, or the private sector. The effects of this inertia have been felt throughout the system. Canada has not fully explored the potential for a greater degree of contracting-out of government R&D services to private firms. Although the stated policy governing federal R&D activities for almost two decades has been one of contracting-out wherever possible, contracted research is typically among the first budget items cut back during times of fiscal restraint. The limited extent of contracting-out has impeded the development of related and supporting industries in many areas, and sometimes militated against the development of more sophisticated industrial demand. Only very recently has the government indicated a willingness to test the potential for private management of government laboratories along the lines of the U.S. "government-owned, contracted-out" model.[146]

Duplication between universities and government laboratories should be a particular concern, given the strain that is currently being exerted on the university R&D system. In 1988, the University Committee of the National Advisory Board on Science and Technology reported that "current funding levels are sufficient only to maintain the existing science base of universities . . . not to contribute toward the establishment of significant new research capabilities." Through the 1970s and the 1980s, the average age of laboratory machinery and equipment almost doubled -- from 5.7 years in 1971, to 10.7 years in 1983.[147]

Poor Coordination: Science and technology policy is an area of shared jurisdiction in Canada. In practice, however, the federal government has been the dominant player, largely due to its dominant funding position: all ten provinces combined accounted for only 18 percent of total government spending on R&D in 1989.[148] A federal-provincial committee of science and technology ministers is nominally charged with ensuring coordination between the two levels of government. However, a lack of coordination nonetheless appears to have diminished the effectiveness of some R&D programs at both levels.

Investment tax credits and most types of direct assistance provided by the federal and provincial governments often interact with each other as well as with the tax system. Support given to R&D is an example. The base for the federal R&D investment tax credit (ITC) is adjusted to reflect any financial assistance from either provincial governments or other federal programs. The value of most provincial tax incentives for R&D is adjusted to reflect the existence of federal income tax credits. (Quebec is an exception, since it does not make such an adjustment.) Some firms active in R&D contend that these adjustments or interactions in the tax system dilute the value of the R&D incentives, since each jurisdiction appears to "tax back" assistance provided by the other. Although this is not the intent of these policies, (which is to ensure that investors in R&D projects do not "stack" tax incentives on top of other assistance and possibly reduce their net R&D costs to less than zero), the interaction of federal and provincial R&D tax measures adds complexity and may deter some R&D activity.

The operation and coordination of provincial and federal government laboratories is also an issue. Provincial Research Organizations (PROs) operate in most provinces. Unfortunately, the relationship between PROs and federal laboratories has at times been competitive, rather than complementary. For example, most federal agencies have discriminated against PROs in determining eligibility for federal contracts. A duplication of resources and capabilities has resulted. Ironically, frustration with this situation provided the original impetus for a quest for self-sufficiency by several of the PROs, since their status as a competing public institution was linked to the receipt of provincial subsidies.[149] In total, provincial funding now accounts for only 36 percent of PRO program subsidies.[150] Those PROs that have become self-funding (in particular, B.C. and Ontario) now compete aggressively for federal contracts, resulting in greater efficiencies throughout the system.

In an attempt to avoid future duplication of research and development programs, individual government research centres have been established that focus their efforts in one particular field. In Quebec, l'Institut National de l'Optique was established to further applications for fiber-optic related technologies. Situated in Quebec City because of its proximity to private sector research centres in the same field, this 40 million dollar venture was jointly funded by both the federal and provincial governments.

D. Other Government Policies Affecting Factor Conditions: The Case of Direct Subsidies

Canadian governments have a long history of subsidizing agriculture, fishing, transportation and various industries, particularly by influencing factor costs. Such government interference has often blunted the market forces that drive innovation. It is thus not surprising that direct subsidies have a poor track record in spurring durable competitive advantage.

Both levels of government have been particularly active in subsidizing energy-related projects, often pointing to the need to secure domestic energy requirements as justification. While the federal government recently withdrew $1.4 billion of funding commitments to the OSLO tar sands project in north-eastern Alberta, it has agreed to subsidize the development of the Hibernia oil field off the west coast of Newfoundland. The $5.2 billion Hibernia project will receive $1.0 billion through direct federal contributions, and another $1.6 billion in loan guarantees. Hibernia oil will be expensive to produce, and the project would not have gone ahead without government assistance, given current world oil prices and near-term trends.[151] Federal loan guarantees have reduced the risks borne by private sector participants who face the prospect of oil prices falling much below current levels.

In many cases, subsidies also have been used as a protective measure to shore up poorly performing firms. Today, Canada has little to show for the $200 million it guaranteed Massey-Ferguson in 1982. Similarly, over the period 1974-1986, when the federal government owned de Havilland, it subsidized the money losing aircraft manufacturer in the amount of approximately $1 billion.[152] In the same industry, the government wrote off $1.4 billion of losses at Canadair in 1983. This pattern fosters an unhealthy attitude of dependence on government as lender-of-last-resort and does nothing to slake the thirst of business for government assistance.

A further example of how subsidies have fostered dependency is in the fisheries industry in Atlantic Canada. Subsidies are so prevalent in the industry that firms often rely on government assistance before making investments -- a rational response to a system of institutionalized subsidization.[153] The restructuring of Fishery Products International (FPI), for example, cost the federal government over $230 million in the

1980s. About $600 million has been pledged to support further restructuring in the industry over the 1990-95 period. Of this amount, $250 million will be channelled to affected individuals and communities, $188 million to the Department of Fisheries and Oceans for fisheries management, $90 million to encourage diversification away from fisheries, and $56 million to facilitate restructuring of the fishing industry. When government support is provided to assist in restructuring, it generally makes the most sense to target resources to individuals rather than to companies. Judged by this criterion, the new fishery industry restructuring program is superior to its predecessor. In many instances, subsidization provides only a temporary reprieve and simply delays rather than encourages inevitable adjustment. For instance, the Newfoundland government recently agreed to pay up to $11 million to delay three FPI plant closures for two years.[154]

Another danger inherent in investment subsidization is that incremental investment by firms will not occur. For example, some $550 million was allocated to the Pulp and Paper Modernization Program between 1979 and 1985 to promote the competitiveness of the industry. Subsequently, research suggested that the program actually added little investment over and above what would have taken place anyhow, that relatively few of the older mills had been modernized, and that as a result of a "buy-Canadian" requirement, more expensive domestic equipment was purchased than would otherwise have been the case.[155]

Subsidies and bail-outs have been a significant drain on the public purse in Canada. The Alberta government has recently written off several hundred million dollars stemming from earlier direct investments in failed business ventures in the province. Rarely justifiable on competitive grounds, government subsidies have almost always been driven by political considerations rather than by a serious intent to promote internationally competitive industries -- notwithstanding frequent rhetoric from governments to the contrary. Like other forms of industrial targeting, subsidization has not been a successful use of public money. Providing large subsidies to industry is a particularly inappropriate policy for Canada's deficit-burdened governments.

8. SUMMARY

Canada's abundant supplies of many natural resources have served as the primary source of competitive advantage for its industries and firms. Many major Canadian export-oriented industries will continue to draw competitive strength from the nation's resource endowments in the future.

Yet resource abundance also points to emerging weaknesses in the economy as a whole. The high quality and low cost of Canada's natural resources, combined with proximity to the U.S. market, has blunted pressures for innovation and upgrading in many Canadian industries. In the absence of consistent pressures for change, Canada has tended to rely heavily on endowed factors, and put less effort into creating higher level advantages. Mindsets and institutional frameworks have developed that retard the economy's capacity to adjust and upgrade, even as the need to do so becomes more pressing.

In the area of human resources, for example, the lack of prestige associated with engineering is symptomatic of the low importance attached to innovation in securing future prosperity. Failure to develop more and larger pools of highly specialized skilled workers sends the same signal. Apparent biases toward commerce-related, white collar professions (and related fields of postsecondary education and training) raise questions about Canada's ability to develop and sustain an adequate supply of advanced skills, particularly in technology-related occupations. Factor specialization has not been a high enough priority, for either government or industry. Traditionally weak links between business and education are partly to blame. Canadian industry's generally poor record in the area of company training has also contributed to the problem.

Canada's low level of R&D spending appears to have stemmed from a combination of reasons, including the absence of pressures for innovation. R&D spending levels in Canadian industries that have faced selective factor disadvantages, or that have drawn their competitive strength from specialized rather than basic factors, often meet or surpass those of their international competitors.

Overall, the availability of capital has not been a major problem for Canadian industry, which benefits from the strength and diversity of the country's financial system. Canada's relatively high cost of capital, however, represents a clear competitive disadvantage. And some growth- and knowledge-intensive firms face significant difficulty gaining access to capital because of weaknesses in the venture capital market and inadequate pools of risk capital.

In spite of many government initiatives and high levels of expenditures, the effectiveness of government programs in stimulating factor upgrading in Canada has often been disappointing. And some policies have been framed and executed not to stimulate upgrading, but to provide protection from change. Canadian governments have too often succumbed to pressures from industry to sustain low input costs, for example, or to neutralize the impact of exogenous shocks to the competitive environment. Similarly, government policies have placed excessive reliance on direct subsidies. In so doing, governments have blunted pressures for adjustment and innovation and sometimes nurtured an attitude of dependency among Canadian firms. Nor have governments in Canada been very effective in leveraging private sector support to upgrade factor conditions. Too often, governments have intervened directly, not merely supplementing private sector activity, but supplanting it. Recent initiatives in areas such as human resource policy and science and technology, however, have demonstrated a greater commitment to private sector-driven priorities.

The effectiveness of government spending in areas related to factor conditions has also been reduced by a tendency to disburse funds over a broad number of programs, resulting in a dilution of both resources and purpose. In part, this reflects the fact that many programs have had multiple and blurred objectives. Competitiveness has not yet emerged as an overriding consideration in evaluating political tradeoffs.

Finally, government's effectiveness in creating a fertile environment for industrial innovation has sometimes been diminished by the absence of effective coordinating mechanisms between federal and provincial policy objectives and expenditures. For instance, Canada's decentralized educational system has made it difficult to establish high education standards. Similarly with R&D the relationship between Provincial Research Organizations and federal laboratories has often been competitive rather than complementary.

CHAPTER 7

CANADIAN DEMAND CONDITIONS

The second broad determinant of national competitive advantage in an industry is home demand conditions for the industry's product or service. In the ten-nation study, home demand conditions had some influence on competitive advantage in the vast majority of the industries studied. This determinant is obviously less relevant in the case of a few industries -- including those that produce relatively unsophisticated commodity products, or that export virtually all of their output. A few Canadian resource industries fall into this category. In most industries, however, home demand is crucial. It shapes the rate and character of innovation by a nation's firms. While home demand can confer static efficiencies through its influence on economies of scale, its more important influence is dynamic.

Three features of home demand are particularly important: its composition (the nature of buyer needs), the size and pattern of growth of home demand, and the processes through which the preferences revealed in home demand are transmitted to foreign markets. The quality of home demand is more significant than its quantity in determining competitive advantage.

This chapter begins by assessing Canadian home demand, with a focus on both consumer and industrial demand. Indicators of the quality and sophistication of demand receive particular attention. The remainder of the chapter then analyzes government's effect on demand conditions in Canada. The key issues covered here are the role of government procurement and standards and regulations in shaping home demand in Canada.

1. CONSUMER AND INDUSTRIAL DEMAND

A. Canadian Consumer Demand

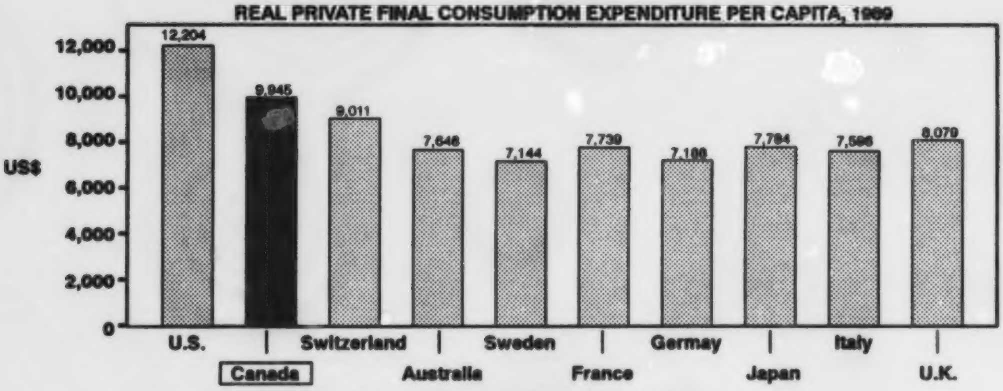
In the ten-nation study, sophisticated consumer demand was found to have had a significant impact on the development of many competitive industries. Although a nation's consumers are never sophisticated across all industries, they typically provide a decisive impetus for excellence and innovation in particular market segments. In Italy, for example, the design sophistication of consumers has played a pivotal role in the success of many design-related industries ranging from ceramic tiles to clothing and shoes. In Japan, audio equipment is a status item, and photography is a national passion. Consumers therefore gather extensive information in order to select the best products and features. Moreover, they upgrade their purchases in these product categories frequently. Such behaviour has exerted constant pressures for quality and innovation on Japanese producers.

In Canada, few examples were found of consumer demand conditions having provided a significant impetus for firm innovation and upgrading. Although Canadian consumers are affluent and have sometimes used their purchasing power to pressure producers for change, several factors have worked to limit the overall sophistication of consumer demand in Canada.

At first glance, conditions seem to favour sophisticated demand in Canada. Canada has the second highest GDP per capita among the G7 nations. Private final consumption is also high (see Figure 7.1). As well, per capita advertising expenditures are the third highest among G7 nations;[1] and even this understates consumer exposure to product information, since a significant volume of U.S. advertising spills over into the Canadian market.[2]

Figure 7.1

REAL PRIVATE FINAL CONSUMPTION EXPENDITURE PER CAPITA, 1989

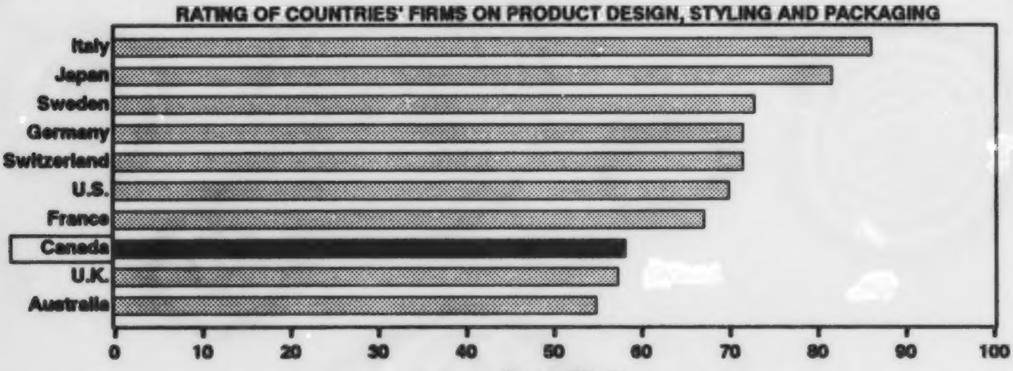


SOURCE: OECD NATIONAL ECONOMIC OUTLOOK, OECD NATIONAL ACCOUNTS

However, a number of factors have dampened the potential for consumer purchasing power to inspire market innovation in Canada. Canadian consumers appear to be less sophisticated than consumers in a number of other nations with respect to product design and styling (see Figure 7.2). In general, Canadians are less inclined to embrace novelty and invention in products than are Japanese and American consumers in particular. Canadian consumers are rarely at the cutting edge in demanding innovation.

Figure 7.2

RATING OF COUNTRIES' FIRMS ON PRODUCT DESIGN, STYLING AND PACKAGING



SOURCE: *IMD SURVEY OF BUSINESS EXECUTIVES*, 1990

In the Canadian groundfish industry, for example, pressures and incentives to upgrade the industry's product line have been diminished by the degree to which Canadian consumer tastes have consistently lagged behind those of the American consumer. Consequently, American suppliers in this industry have been first to market everything from microwaveable and easy-serving portions to diet-suitable products. In fact, even some Canadian producers have introduced new products to the Canadian market only after successful launches in the United States. As another example, games maker Nintendo recently announced that its next generation 16-bit line of games, recently introduced in the U.S. would not be made available in Canada until 1992, because the Canadian market had developed at a slower rate: ". . . a lot of Canadian consumers haven't had an opportunity yet to fully explore the existing 8-bit software."[3]

In the life insurance industry as well, most new products are launched in the U.S. before being introduced in Canada, although Canadian consumers have typically been fast followers. More recently, Canadian demand for life insurance products appears to be growing in sophistication. This is due, in part, to the unusually strong growth of group premiums in Canada since group buyers tend to be both more knowledgeable and more powerful.[4]

The sophistication of consumer demand in Canada has been further diminished by an apparent reluctance on the part of Canadian consumers to pressure producers for innovation and change through more formal channels. Data from the Better Business Bureau indicates that Canadians are only half as likely to voice complaints as Americans.[5] In the U.S., many industry associations have initiated third-party resolution programs in response to consumer complaints. Consumer Actions Panels now exist in most durable goods industries in the U.S., and have evolved as viable substitutes to judicial redress in many circumstances. In Canada there is only one such program, that of the Ontario Motor Vehicle Manufacturers' Association.[6]

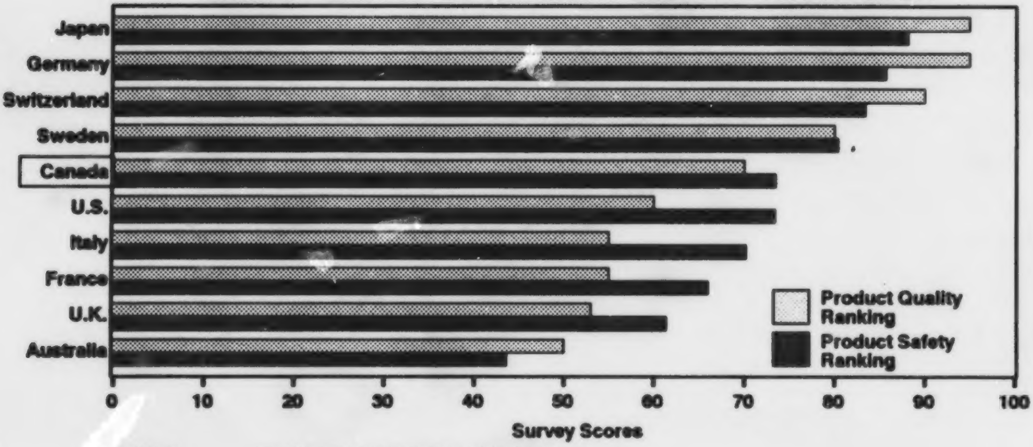
Similarly, the consumer movement has never developed strong momentum in Canada, and is noticeably weaker than that in the United States. In fact, consumer pressures frequently spill over from lobbying efforts in the United States. In other instances, government surrogates have emerged to fill the vacuum in Canada. In general, Canadian governments have assumed a larger role in the protection of consumer interests than have governments in the United States. An example is provided by Canada's Eco-Labelling Program, a program that is designed to better inform consumers of the environmental impact of the products they buy. Such programs are emerging in the U.S. as independent collaborations among public interest groups, business and government.[7] By contrast, Canada's nascent Eco-Logo program has initially been funded by the Department of the Environment, although it is controlled by an independent Board of Directors. Even the Consumers' Association of Canada is largely dependent upon government funding, after having gone bankrupt in 1988.[8]

Such characteristics have limited the extent to which Canadian consumers have stimulated Canadian producers to innovate and upgrade. The internationally competitive position of hockey-related equipment is an exception which has largely been driven by the enthusiasm and expertise of Canadian hockey fans. Similarly, widespread popular interest in environmental issues has provided a strong impetus for the development of environmentally-friendly consumer goods in Canada. Procter & Gamble, for example, successfully launched its Enviro-Pak in Canada shortly after it was developed in Germany; similar products were not launched by P&G in the U.S. until two years later. The green line of store-brand consumer products introduced by Weston Foods has also met with great success in the Canadian marketplace.

These examples, however, are not typical of the industries surveyed. In general, consumer demand appears to have had a more neutral effect on the development of Canadian competitive advantage: consumer demand conditions have rarely served as a source of advantage. This position is illustrated by Canada's average ranking for product safety and quality, as reported by the IMD Survey of Business Executive (see Figure 7.3). Although Canadian products are thought to be of a lower quality than those of Japan, Germany, Switzerland and Sweden, they surpass the standards of several other G7 nations.

Figure 7.3

RATING OF COUNTRIES' FIRMS ON PRODUCT QUALITY AND PRODUCT SAFETY



SOURCE: *IMD SURVEY OF BUSINESS EXECUTIVES*, 1990

B. Canadian Industrial Demand

Several characteristics of industrial buyers in Canada were found to have weakened the sophistication of home demand and to have worked to the disadvantage of industry competitiveness. The high degree of price sensitivity of many Canadian buyers has been one key factor. Patterns of technology adoption in Canada also tend to undermine the ability of home industrial demand to strengthen competitiveness. In addition, relatively high levels of concentration in many buyer industries have frequently worked against the sophistication of demand and blunted pressures to innovate. In those instances where sophisticated industrial demand was identified, it was most often in industries that had been forced to innovate in the face of adverse geographical conditions. In a few instances, competitive advantage has also emerged in response to forward-looking regulations and standards.

I) Low-cost Orientation of Industrial Buyers

As will be discussed further in Chapter 9, Canadian firms in a large number of the industries surveyed have pursued low-cost strategies. This is not surprising given that a significant proportion of Canadian industries produce for commodity markets. However, in many cases "low-cost" has translated into "lowest possible price" in the buying behaviour of Canadian firms, with little weight given to non-price purchase criteria. This orientation, which has manifested itself in various ways, has had an impact on a wide range of industries.

In the pulp and paper industry, Canadian buyers' emphasis on cost control has limited the scope for supplier innovation. As discussed in Chapter 4, Canadian and Scandinavian firms have traditionally carried out mill design and equipment procurement in fundamentally different ways. While Scandinavian firms often involve potential suppliers in the early stages of the design process, Canadian firms typically rely on third-party engineering firms to complete most of the design work. Detailed specifications are then put out to tender and awarded to the lowest bidder. In Canada, suppliers are thus usually brought in only to build equipment to specification; there is little or no incentive to innovate beyond these requirements.

Examples of such build-to-blueprint relationships with suppliers were also found in the automobile industry. Canadian (and U.S.) autoparts suppliers have traditionally been given little leeway by their industrial customers in the area of component design. Parts suppliers' propensity to invest in R&D is consequently much lower than their Japanese counterparts, which typically work to performance standards.

The health care industry in Canada has been particularly vulnerable to the impact of price-sensitive buyers. As paymasters for health and medical services, governments in Canada understandably are highly sensitive to the product costs of related industries, both because of their dominant position as a buyer and also as an extension of their commitment to ensuring universal access and affordability. The budgets of Canadian hospitals, for example, are centrally administered and tightly controlled. New technologies, therefore, are rarely diffused through the Canadian system until product costs come down.

The low-cost orientation of Canadian health services may help to explain the difficulties that Canadian producers of cobalt radiation therapy equipment had breaking into the market for linear accelerators, a second generation radiotherapy technology. Linear accelerators were first introduced for widespread commercial use in the late 1960s, roughly a decade following the introduction of cobalt therapy. The adoption of linear accelerator technology by Canadian medical institutions was relatively slow, however, in part due to its high cost relative to that of cobalt equipment. Consequently, linear accelerators accounted for only four percent of high-energy radiotherapy units in Canada by the late 1970s, compared to 26 percent in the U.K. and 15 percent in the United States.[9] This inevitably contributed to the difficulty facing Canada's leading producer of cobalt radiation equipment, Atomic Energy of Canada Ltd. (AECL), when it tried to establish a viable position in the linear accelerator market. In 1985, AECL abandoned this market altogether, and decided to focus on cobalt technology. All other major international competitors have instead shifted the balance of their business to the now much larger and higher-growth linear accelerator segment of the radiotherapy equipment market.

Paradoxically, the price-sensitivity and low-cost orientation of Canadian health care services may eventually become a source of competitive advantage for Canadian suppliers. Concerns over escalating health care costs are mounting in almost all industrialized countries as populations age and the cost of medical technologies escalates. The U.S. Health Care Finance Administration, for instance, recently moved to a diagnosis-related groups (DRG) reimbursement system, which sets generic reimbursement levels for any given treatment, rather than reimbursing on a cost-of-service basis. Incentives are thereby created throughout the system to use the most cost-effective technology possible. Third-party participants (private insurers) are expected to follow suit. While Canadian cobalt-60 technology is currently used as a low-cost substitute in many developing countries, the market for such an alternative may well grow elsewhere in the future.

ii) Conservative Patterns of Technology Adoption

It has often been noted that Canadians tend to be averse to risk.[10] As individuals, Canadians buy more insurance and invest in "safer" assets than Americans or citizens of some other countries, for example. Among industrial and commercial buyers, risk aversion seems to have manifested itself in a reluctance to be involved in testing or prototyping new products. In the extreme case, examples were even found of Canadian producers being forced to turn to foreign markets for the first sales of a new product. In the geophysical contracting industry, for example, efforts to market a new advanced electro-magnetic surveying device were unsuccessful in Canada. The first sales were subsequently made to Anglo-American for use in South Africa. Even within Canada, one mining industry executive remarked that "it has generally been foreign-owned companies, the multinationals, that have supported the development of new technologies."[11]

Similarly, in the pulp and paper industry, almost all equipment innovations are developed in Scandinavia, where pulp and paper producers work with equipment manufacturers to test new pieces of equipment. Canadian equipment manufacturers frequently complain that Canadian producers are unwilling to allow any new equipment to be tested in their plants. As one executive observed, "Canadians want to be first to be second -- they want proven technology."[12]

Canadian firms also tend to adopt new technologies in a piecemeal fashion. This makes them unlikely candidates to be early buyers of new products. A report commissioned by the Department of Industry, Science and Technology highlights this tendency. In reviewing the technology adoption patterns of Canadian manufacturers, the report concludes that "in the main, process improvements were implemented in small increments . . . without having an overall systems view of where they were heading."[13]

Indeed, a number of Canadian-based machinery equipment manufacturers surveyed across a range of end-use industries spoke of short-sighted investment patterns for capital equipment. Several also commented on the propensity of Canadian buyers to try to make do with incremental investments in existing equipment, rather than investing in entirely new systems. Senior executives of firms supplying a variety of manufacturing and resource industries -- particularly the mining, pulp and paper and material handling industries -- echoed a common theme: Canadian firms frequently prefer to repair and retrofit rather than embark on strategies of upgrading technologies over the long run.

iii) Relatively Few Independent Buyers

A relatively low incidence of independent buyers was a noteworthy characteristic of many of the industries surveyed. Buyer concentration can work both for and against the sophistication of demand, depending upon the industry and the buyers' strategies. On one hand, the presence of large and powerful buyers can pressure producers to introduce new models and reduce costs. At the same time, however, buyer concentration can also serve to shut new entrants out of the market and allow a dominant buyer to capture a disproportionately large share of an industry's profits by squeezing supplier margins. It also increases the risks associated with becoming a supplier to the industry. In general, a larger number of independent buyers can be expected to lead to a more dynamic marketplace, and to produce greater pressures for innovation and upgrading.[14]

The relatively low incidence of independent buyers found in Canadian industry was largely attributable to three characteristics common to many of the buyer industries surveyed: high concentration levels, a high incidence of vertical integration, and government ownership or regulation that led to monopolistic control over industry distribution channels.

High Concentration Levels: High industry concentration levels frequently leave buyers in a powerful position that enables them to bargain away a supplier's profits. Such a relationship between buyers and suppliers inevitably constrains the latter's ability and incentive to innovate. An illustration of this type of relationship is found in the Canadian auto assembly industry. The industry typically subjects its parts suppliers to extremely low margins on short-term contracts. In contrast, Japanese original equipment manufacturers work closely with their suppliers over long periods of time. Suppliers are entrusted with the development of component design, and are strongly encouraged to invest in new technologies.

Market concentration need not result in relentless pressure on suppliers' margins and weak incentives for them to innovate. In some industries characterized by sophisticated demand conditions, powerful buyers have had a positive impact on the upgrading of supplier industries. Such conditions are most likely to emerge when rivalry is intense between a number of capable customer firms, and when the competition between them is driven, at least in part, by non-price criteria. The food retailing industry in Canada, for example, has grown increasingly concentrated. Yet at the same time, the emphasis on retail chain differentiation has grown. In the 1970s, this rivalry was partially played out in efforts to enhance the quality of stores' fresh produce and meat offerings. Recognizing the growing consumer preference for leaner meats, retail chains pressured suppliers to provide appropriate products. Partly as a result of these initiatives at the retail level, specialized feeding and breeding techniques and technologies were developed: Canadian standards for beef, and particularly for pork, are currently among the leanest in the world. Loblaws recently successfully pressured its suppliers to use environmentally-friendly packaging, providing further evidence of the positive impact that powerful buyers can have on supplier upgrading.

Captive Supplier Relationships: The relatively low incidence of independent buyers in the Canadian marketplace is also attributable to widespread vertical integration in the industries surveyed. This is particularly true of the resource industries (for example, aluminum, market pulp and styrene.) Often, vertical integration leads to captive buying relationships that can dampen competitive pressures for innovation. Uncompetitive pricing is more easily sustained within captive relationships, especially when exit costs are high. This is currently a threat to the future competitiveness of Dow in styrene. Dow sells no styrene on the open market --consuming all of its output internally. As a result, it has been able to sustain production facilities that are roughly one-fifth of the industry's minimum efficient scale.[15]

In the Canadian life insurance industry, a high percentage of product sales have always been sold through company-owned distribution channels. By contrast, independent brokers control 43 percent of the market in the United States. In the U.S., more intense competition between insurance brokers puts pressure on insurance companies to continuously innovate (see Figure 7.4).

Figure 7.4
LIFE INSURANCE SALES BY DISTRIBUTION CHANNEL

	% Brokers		% Tied Agents		Other	
	1983	1989	1983	1989	1983	1989
Canada	22	31	78	69	0	0
U.S.	36	43	62	56	2	1
U.K.	-	44	-	32	-	24

SOURCE: LIFE INSURANCE MARKETING AND RESEARCH ASSOCIATION

Government-Regulated Monopoly Buyers: Finally, small numbers of independent buyers in some sectors can be traced to government control or regulation. The impact of government ownership on the sophistication of Canadian demand is particularly striking in the health care industries and in liquor distribution. In Canada, roughly one-third of all pharmaceutical products are purchased under government-administered health plans. Under these plans, pharmacists are reimbursed by the government at the standard rate for generic products, unless the prescribing doctor specifies that a brand-name drug be used. If a generic drug exists, it will almost always be offered in the absence of a doctor's recommendation. Government control of liquor distribution has limited specialized skill development and prevented Canadian distillers from entering otherwise related fields such as retail, wholesale and brewing.

iv) Sophisticated Demand from Geographical Adversity

Difficult conditions created by Canada's geography have spawned demanding buyers in some industries. The vastness of the country, the composition of its mineral deposits, and its severe climate have all necessitated innovation to satisfy local requirements. The expanse of the Canadian landscape spurred the development of airborne surveying techniques. In telecommunications, long distances fostered demand for tropospheric transmission technology and the first geostationary satellite for domestic use. As well, Canada's invention of high-voltage power lines made it possible to transport electricity across long distances with minimum efficiency losses.

Innovation and competitive advantage have also been facilitated by the unique composition of Canada's mineral deposits. Access to Canadian mineral ores is difficult due to the hardness of the rock, the depth of the deposits and the high sulphur content. Such conditions have created a demand for unique explosive devices and bulk-mining techniques. Canada has also developed expertise in processing high-sulphur-content natural gas. In addition, Canada's cold climate has led to domestic innovations in energy efficient housing, which have contributed to export success for Canadian manufactured housing in many countries with extreme climates. In agriculture, Canada's cold climate has encouraged the development of winter wheat strains, now grown in many northern nations.

v) Impact of Anticipatory Regulatory Standards

Stringent standards for product performance, product safety and environmental impact can contribute to the creation of competitive advantage by pressuring firms to improve quality, upgrade technology and provide for features in areas of important customer (and social) concern. Particularly beneficial are demanding regulations that anticipate standards that will spread internationally.

Canada's failure to set anticipatory standards in many areas of environmental regulation has inhibited the development of indigenous pollution control industries. Canada currently imports most of its pollution control technology, much of it from countries that have pre-empted Canadian regulatory practices. Laidlaw's proposed rotary kiln incinerator in Sarnia, Ontario will use German-supplied equipment and technology. As well, most secondary treatment procedures and alternative pulping processes employed by Canadian pulp producers have been developed in either the U.S. or Europe.

At times, lagging standards have also hurt Canadian industries more broadly. The Canadian forest products sector currently faces the threat of a European boycott in response to the continued practice of clear-cut logging in Canada. As well, Quebec Hydro contracts with utilities in New York state (and the future of James Bay II) may be in jeopardy owing to political pressures exerted by New York state interest groups opposed to projects that they allege do not meet the state's own environmental standards. The nature and consequences of Canadian environmental standards will be discussed in more detail in the section on government policies.

In areas where Canadian regulators have established stringent regulations in advance of other jurisdictions, positive outcomes have often resulted. Canadian standards in the area of occupational health and safety are among the toughest in the world. The beneficial consequences of such standards were noted in some of our industry surveys, in particular industrial explosives and nickel mining. Strict Canadian safety restrictions on the transport of explosives over long distances, for instance, led Canadian firms to develop the technology for explosives that could be readily mixed on-site. The design of Canadian facilities for the production of explosives is also very strictly regulated, both in terms of construction materials and building separation requirements. As a result, the damage from a recent explosion within the facilities of a Canadian producer of sodium azide -- a highly combustible material -- was well contained. A similar accident in the facilities of a U.S. competitor destroyed the building beyond repair. ICI Explosives Canada consequently emerged as the sole producer and chief supplier of sodium azide in North America.

In the nickel mining industry, the danger of underground sulphide mining and the stringency of Canadian occupation safety standards have stimulated firms to develop continuous bulk-mining techniques. Inco, for example, developed vertical retreat mining techniques, a high-productivity and highly mechanized "bulk mining" method. The benefits of this innovation have spilled over into several areas of the company's operations -- quite apart from its positive effects on worker safety. Bulk-mining systems are up to ten times as productive as traditional methods, and use far less labour, energy and other materials. Between 1980 and 1986, the productivity of Inco's Ontario Division nearly doubled.[16]

In other cases, demanding technical standards have been developed at the instigation of industry itself. The long-term results of such initiatives have frequently been encouraging. Canadian standards for manufactured housing are now among the highest in the world, though they have not always been so. The original impetus for upgrading came from industry-initiated technical standards, not government regulation. In the late 1960s, Canadian industry standards lagged those in the United States. By establishing national standards, the industry hoped to achieve three ends: economies of scale impossible without interprovincial harmonization, lower cost inspection procedures, and creation of a de facto non-tariff barrier to U.S. imports. The movement to a mandatory national standard did reduce imports from the United States. But the new standards also substantially increased the cost of manufactured housing relative to site-built units within Canada. As a result, manufactured housing's share of the domestic housing market fell by 60 percent within ten years; manufacturers were then forced to turn to export sales to maintain production volume. With product standards among the toughest in the world, the Canadian industry has found a ready market for its product in many regions with extreme climatic conditions or strict energy efficiency requirements.

C. Size of Canadian Demand

The quality of home demand is typically more important for competitiveness than its quantity. However, the absolute and relative size of a home market can influence competitiveness in some circumstances.[17]

- Disproportionately high (per capita) demand for a product in a given country can cause that country's firms to devote greater and earlier attention to a particular market segment.
- Early product penetration in a country helps local firms become established. Early saturation of the home market forces local firms to innovate, upgrade and look for opportunities in foreign markets in order to sustain growth.
- Home market size is most important to national competitive advantage in certain industries, notably those with heavy R&D requirements, substantial economies of scale in production, large generational leaps in technology, or high levels of uncertainty. Countries with smaller home markets will find the quality of home demand less important in industries with these characteristics, although sophisticated home demand can still strengthen competitiveness.

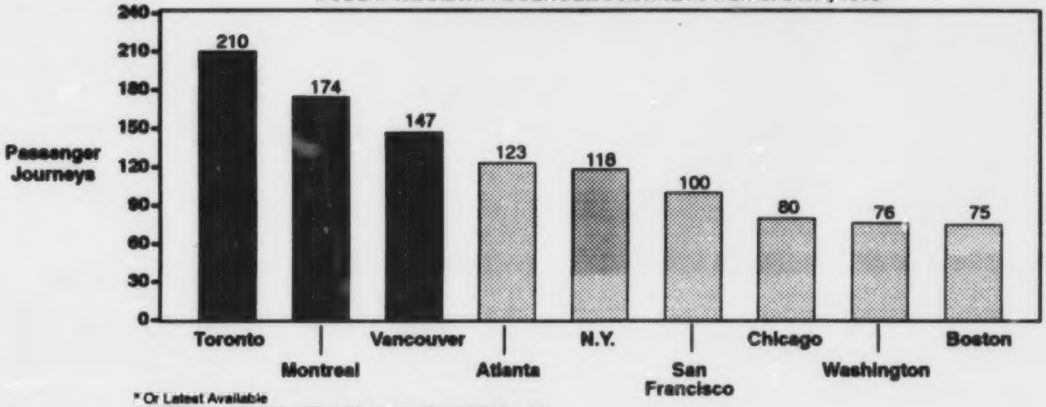
I) High Per Capita Consumption Industries

The ice skate industry illustrates the positive influence that disproportionately large home demand can have on an industry's development. Hockey is arguably more popular in Canada than anywhere else in the world. Per capita demand for ice skates in Canada is almost thirty times higher than in the U.S., and over forty times higher than in Europe. This concentration and sophistication of demand has promoted the development of a broad cluster of industries. Hockey is a professional sport with world-class players, coaches and clinics. It is also a form of entertainment with products such as videos and hockey cards. And the amateur market provides a large demand for equipment such as sticks and helmets. Not surprisingly, Canadian manufacturers dominate the world in most related product segments. In ice skates, for example, Canadian firms account for roughly three-quarters of world sales on a dollar value basis.[18]

A further example of how competitive advantage can emerge from high per capita consumption is found in the urban transit industry. Canada's three largest cities lead North America in per capita usage of public transit, as measured by passenger journeys (see Figure 7.5) The size and sophistication of Canadian demand is evidenced by the fact that the Toronto Transit Commission is widely regarded as a world leader in terms of safety, technology and operating efficiency. Adoption of a state-of-the-art transit system in Vancouver is a further sign of sophisticated home demand. Favourable home demand conditions have provided a fertile environment for the development of world-class urban rail producers. In addition, Canadian consultants on transit system design and operation enjoy an excellent reputation world-wide.

Figure 7.5

PUBLIC TRANSIT PASSENGER JOURNEYS PER CAPITA, 1988*



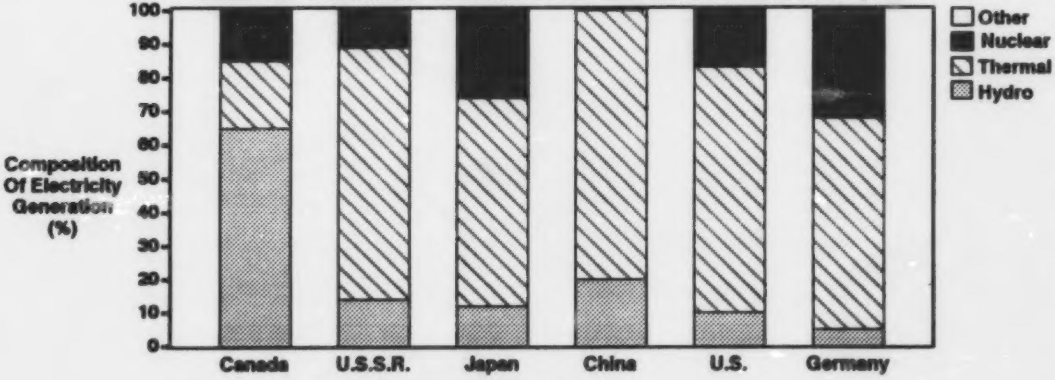
* Or Latest Available

SOURCE: JANE'S URBAN TRANSPORT SYSTEMS, 1990

Similarly, Canada is unique among industrialized nations in the importance of hydro-electric power relative to overall electricity needs (see Figure 7.6). As a result, Canadian electrical utilities and consulting engineering firms such as SNC/Lavalin have developed unparalleled expertise in the management and design of large-scale hydroelectric power sites, as well as long distance transmission and distribution systems. This expertise has subsequently been exported to other regions of the world in the form of electric power systems analysis, design, planning, construction and management services.

Figure 7.6

SELECTED COUNTRIES' SOURCES OF NET ELECTRICITY GENERATION, 1987



SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION

II) Benefits of Early Penetration and Saturation

In several of the industries studied, Canadian firms moved quickly to penetrate lucrative export markets in response to saturation of the home market. Examples include the flight simulator and commuter aircraft industries. Pressures to export have been particularly acute for scale-sensitive industries.

Economic cycles have had a significant impact on the development of competitive advantage in the geophysical contracting industry. The Canadian government was among the first in the world to undertake extensive surveying of its territory. This encouraged the early development of surveying services and related industries. Later, the cyclical nature of the mining industry led to a quick saturation of the domestic market and to a dearth of domestic geophysical contracts in the 1960s (and then again in the early 1980s). During these periods, Canadian firms were forced to look overseas in order to sustain revenues. As a result, export business has grown to roughly 60 percent of Canadian sales.

The telecommunications equipment industry is a prime example of an industry that requires scale for competitive advantage. As discussed in Chapter 4, the Canadian telecommunications industry has certainly benefited from a challenging home market with demanding end users: Canada leads the world in household telephone penetration rates. However, the absolute size of the Canadian market was a major limitation for scale-sensitive equipment such as central office switches. Canadian firms were forced, therefore, to find new markets abroad at an earlier stage in their development than either U.S. or European firms preoccupied with larger home demand. This gave Northern Telecom a head start in the U.S. market, where it is currently a leading supplier of central office switches.

Many of Canada's resource extraction industries also demonstrate the effects of significant scale. In these industries there is a strong orientation to export markets, since Canadian consumption typically accounts for only a fraction of available capacity. Canada's nickel consumption, for example, amounts to less than five percent of annual production from Canadian mines. Resource extraction industries are consequently among Canada's largest export industries.

2. GOVERNMENT'S EFFECT ON DEMAND CONDITIONS

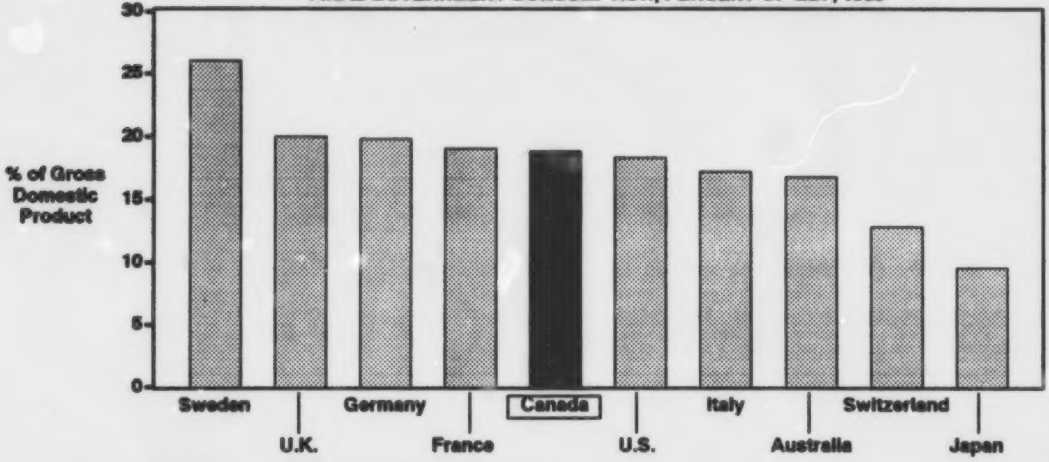
Demand conditions in a nation are affected by many factors, including geography, history, culture, levels of wealth and income, and company strategies. Government, however, also has an influence. Governments' leverage over home demand arises mainly in two areas: government procurement, and standards and regulations. The role of government policies in Canada in these areas is analyzed in this section.

A. Government Procurement

The most direct way government affects demand conditions is through its role as a buyer of goods and services. In Canada, government spending on goods and services amounts to roughly $100 billion annually, or 18 percent of GDP.[19] This level of spending is comparable to OECD averages (see Figure 7.7). The federal government accounts for 25 percent of this amount, with the remainder divided between the provinces and municipalities.[20] The potential of government procurement to influence Canadian demand conditions is, therefore, substantial.

Figure 7.7

FINAL GOVERNMENT CONSUMPTION, PERCENT OF GDP, 1988



SOURCE: OECD NATIONAL ACCOUNTS, 1988

Government procurement can be a positive force for upgrading national competitive advantage if it serves as a demanding and sophisticated buyer. A strong element of competition is essential. Moreover, rigorous product specifications must be set, and advanced product varieties sought, as opposed to simply accepting what domestic suppliers offer. Governments must also be willing to provide early demand for advanced new products in order to encourage local suppliers to pursue next-generation technologies, as well as entirely new product areas.

Government procurement works against international competitive advantage when selling to government agencies becomes a guaranteed market for local firms through national preference policies. Once this cycle of dependency has been set in motion, firms continually lobby for idiosyncratic product standards or other regulations to block competition from international -- or out-of-province -- rivals.[21]

In Canada, government procurement has contributed to the success of several competitive industries such as flight simulators, geophysical consulting and consulting engineering. By and large, however, these successes appear to have evolved as somewhat random events, rather than as the result of a comprehensive and consistently applied set of procurement polices and practices. In fact, several elements of the framework which governs Canadian procurement appear to have impeded the development of competitive advantage. Discriminatory criteria within the supplier selection process, for example, have frequently distorted the competitive environment.

As well, government demand is rarely anticipatory -- suppliers have not been consistently challenged to develop next-generation technologies.

l) Discriminatory Supplier Selection Practices

The effectiveness of government procurement as a stimulus to firm innovation and upgrading has often been diminished by distortions within the competitive environment. In the Canadian context, such distortions have emerged largely in response to regional development issues at the federal level and as a result of policies designed to protect and favour local suppliers at the provincial level.

Regional economic development objectives have always played a role in the procurement decisions of Canadian governments. Over the years, these objectives have been achieved by varied means. With certain programs, regional spending allocations have been explicit. The mandate of the Canadian Space Agency, for example, includes the equitable distribution of federal aerospace expenditures across the nation. In other instances, political influence has been brought to bear on procurement decisions mid-way though the tendering process. The awarding of a large CF-18 engineering contract in 1989 to Montreal-based Canadair Ltd., rather than Bristol Aerospace of Winnipeg, is an example often cited by Canadian observers. Although the Bristol proposal was judged technically superior by an independent panel and was also lower-priced, the contract was awarded to Canadair Ltd., reportedly on the grounds of economic development.[22] Another example was the federal government's decision to require the prime New Brunswick-based contractor for its multi-billion dollar navy frigate program to sub-contract the construction of several of the frigates to a Quebec-based shipbuilder. The result of dividing the contract in this way has been disastrous -- lengthy delays, major technical problems, acute financial distress for the Quebec shipbuilder, and threatened legal actions between the two companies involved.

At the provincial level, competition is restricted by a variety of implicit and explicit mechanisms. Preferential bidding rates, generally in the range of five to ten percent, are common in most provinces for in-province suppliers. As an example of the impact of such practices, the Canadian Manufacturers' Association cites the efforts of an Ontario-based pharmaceutical producer to penetrate the Quebec market. The Ontario firm's bid on a large hospital contract was reportedly 11 percent below that of its Montreal-based competitor. Although the contract was initially awarded to the Ontario firm, that decision was later rescinded on the grounds that "special" but unspecified conditions had qualified the Quebec-based firm, in spite of its higher priced bid.[23]

Implicit discrimination is frequently achieved by provincial governments in their use of technical specifications as a non-tariff barrier to interprovincial trade. The problem is particularly acute in the area of electrical standards. Although the Canadian Standards Association (CSA) is the accepted standard among manufacturers, provincial variations abound. As a result little uniformity is found across the country. Quebec-produced grain grinders with CSA-approved components, for example, were recently rejected by an Ontario Crown corporation that had "determined a higher standard of acceptance."[24]

Such discriminatory practices on the part of the provinces have resulted in high costs to the Canadian economy. In its proposal for the creation of a single economic market in Canada, the CMA recently estimated that existing interprovincial barriers within the provincial procurement markets cost provincial treasuries roughly $6.5 billion annually (out of a $100 billion market).[25] Although this is a crude estimate, the volume of business affected by provincial procurement preferences is clearly substantial.

In the telecommunications wire and cable industry, for example, the discriminatory practices of provincial Crown corporations have resulted in highly inefficient, sub-scale manufacturing operations being scattered throughout the country. It has been estimated that in the absence of preferential procurement practices on the part of provincial telephone companies, the Canadian telecommunications wire and cable industry would maintain only three or four of the 16 plants currently operating in Canada. The 11 small satellite plants built to establish the pre-requisite "regional presence" account for only 15 percent of the industry's total capacity.[26]

ii) Suppliers Rarely Pressed to Develop Leading Edge Technologies

The effectiveness of government procurement as a stimulus to firm innovation depends not only upon the existence of a highly competitive process in the selection of its suppliers, but also on a government's willingness to provide early demand for emerging technologies, and entirely new products. Early government demand is often a key stimulus to the development of next-generation-technologies. It may also be instrumental in helping domestic firms establish the track record and credibility (proof of performance) required to successfully sell new products into foreign markets.

A demonstration of the impact of early government demand can be seen in the case of UTDC in the urban transit industry. In that industry, buyers are particularly cautious; system safety takes precedence over "innovation" in the buyer's purchase criteria. Proof of performance is therefore essential. In 1980, Vancouver's transit authority decided to contract an entirely new light rapid transit system, rather than procuring existing technology. This contract provided UTDC with the critical first sale of its fully automated, linear-induction motor system. The ability to demonstrate the system in operation greatly enhanced the credibility of UTDC's tenders for Bangkok's proposed subway system and other foreign projects.

In Canada, relatively few examples were found of government procurement having provided early demand for next generation technologies. That governments have not done so is attributable to several factors, notably the absence of long-term planning horizons, an orientation to off-the-shelf purchasing, an emphasis on design specifications and often fragmented expenditures.

Short Planning Horizons: If government procurement is to effectively stimulate early demand, firms must have lead times to prepare to meet government needs. This is particularly true for products which employ advanced technologies. Yet, few federal departments or agencies -- or provincial governments -- develop long-range capital budget plans. Canadian firms are seldom given enough time to develop the skills necessary to produce the product or to form strategic alliances for technology transfer to Canada. Consequently, for highly sophisticated products, foreign suppliers with past product experience and expertise are often the only alternative. Although the problem of inadequate planning horizons has been acknowledged, prospects for change in the near future are not promising.[27] Capital spending budgets have proven particularly volatile in an era of fiscal restraint and ongoing spending cuts.

Buying Off the Shelf: Pressures and incentives for Canadian firms to develop next-generation-technologies have also been reduced by Canadian governments' orientation to off-the-shelf purchasing. In part, this practice is due to the understandable importance of cost considerations. Senior managers within the federal bureaucracy are required to deploy capital budgets in such a way as to maximize the "operational returns" of their own departments. As a result, developed systems must typically be purchased wherever possible, even if such systems are only available from offshore suppliers. Ministerial accountability and public concerns about the potential for abuse further heighten the price sensitivity of procurement officials.

Governments' orientation to off-the-shelf purchasing is also partly explained by a relatively low risk threshold. Risks associated with the development of new systems and technologies are often thought of as a luxury that a country as small as Canada cannot afford. A recent review by the Government Procurement Committee of the National Advisory Board on Science and Technology underscored the need for operational agencies to assume a higher degree of risk.[28]

Emphasis on Design Specifications: Although the federal Treasury Board's stated policy clearly supports performance specifications, the use of design specifications still appears to be widespread. Most often, specifications are established on the basis of products which currently exist in the marketplace. The Nielsen Task Force on government spending reported in 1985 that one of the four most commonly cited complaints about government procurement practices among Canadian manufacturers was the tendency to specify overly detailed technical and/or product-specific requirements.[29] Provincial procurement practices are often particularly constraining in this respect, since technical specifications are sometimes used as a non-tariff barrier to interprovincial trade.

The potential for performance standards to stimulate industry innovation can be seen again in the urban rail industry. In the late 1970s, the Ontario Government sought to increase rail car capacity in order to accommodate the significant growth of commuter traffic in and out of Toronto. In response to this functional need, the Canadian operations of Hawker Siddeley designed and developed the bi-level rail car. Since then, metropolitan areas all over North America have purchased this type of equipment. UTDC (which subsequently bought the assets of Hawker Siddeley) has sold a similar system for use in the Miami/Palm Beach area and has also recently signed a contract with the Los Angeles transit authorities.

Funds Spread Thinly Among Too Many Suppliers: Governments at various levels have frequently yielded to political pressures to spread spending among numerous different suppliers. Consequently, the most competitive firm may not always acquire the expertise necessary to develop world-class product expertise and production capabilities.

Provincial governments seem to be especially vulnerable to such pressures. Highway construction projects in British Columbia, for example, are often broken into very small sections for bidding purposes. Firms that have won several sections are frequently excluded from further bidding. In Ontario, the provincial government has traditionally spread its software development work between a number of small local suppliers. By contrast, the Quebec government has deliberately concentrated its procurement in the hands of fewer suppliers, supporting the development and growth of a few internationally competitive firms.

The federal government has tried to get around this problem by relying on prime contractors to develop and oversee subcontracts as required. The use of "total systems contracting" has been quite common for infrastructure-related projects.

iii) Positive Initiatives

Like all governments, the Canadian government prefers to award contracts to Canadian suppliers wherever possible. At the federal level, Canada is a signatory to the GATT Agreement on Government Procurement -- a commitment which, theoretically, prevents government agencies from discriminating against foreign suppliers in the provision of government-purchased goods or services. In addition, the Canada-U.S. Free Trade Agreement lowered the GATT threshold for "open" contracts from $235,000 to $20,000 for American suppliers. In practice, however, the GATT code has had little effect on the day-to-day procurement practices of the Canadian government (or that of other countries), in large part because most goods and services falling within the jurisdictions of defense, transport, communications and fisheries are not subject to the code.

However, in spite of the government's broad discretion to favour domestic suppliers, federal government policy has recognized the importance of a competitive bidding environment. In general, supplier selection is not restricted to Canadian firms if doing so eliminates "effective competition"; in most cases, "effective competition" requires the participation of at least three firms. If three domestic suppliers are not capable of competing for a given contract, competition will ordinarily be opened to foreign firms. This practice stands in contrast to the far more protectionist provisions of the Buy America Act in the U.S., for example, which stipulates that American government contracts must demonstrate at least 50 percent American content, regardless of the resulting impact on competitive conditions.

Recent initiatives have further enhanced the competitive environment for federal and provincial contracts. For instance, government agencies now rely less on source lists (that is directories of companies known to be willing and able to supply government purchases) and government-initiated invitations to bid on specific contracts. Most contracts must now be published in a daily magazine and on an electronic "Procurement Opportunities Board", which means that the bidding process is open to all interested parties.

As well, a Procurement Review Board was established in 1988 to provide recourse for companies that feel unfairly treated in procurement contracts. Both Canadian and foreign firms can challenge the use of various loopholes frequently used to restrict competition in the tendering process.

In recent years, steps have also been taken to minimize the economic distortions caused by regional development considerations. All federal bids over $25,000 are now subject to a nation-wide "Open Bidding" policy; access cannot be restricted to regional suppliers, as was often the case in the past. As well, procedures for ministerial involvement in the decision-making process have been streamlined. Most importantly, explicit agreement has been reached within the federal bureaucracy as to the relative importance of various procurement criteria.

At the provincial level, governments are also growing increasingly sensitive to the consequences of inter-provincial discrimination. Some progress has been made toward opening the inter-provincial procurement market in Canada to greater competition from out-of-province suppliers. Recently the four Western provinces signed a "Western Accord" that addresses procurement issues; a Maritime Provinces Procurement Accord has also been negotiated.

Services Contracted Out: The federal government has steadily increased its use of contracting-out, despite constraints imposed by union agreements and a recent court ruling prohibiting the layoff of federal employees as a result of such practices. The federal government's new Public Service Reform Act has been designed to further increase its freedom to contract out services wherever possible. Moving in this direction should have a positive impact in strengthening the competitive advantage of supplier industries in the private sector.

The use of external contractors has also increased at the provincial level. In British Columbia, for instance, maintenance work previously done by the Department of Highways is now contracted out to private construction firms. The potential for such practices to stimulate the development of local firms has been well documented.[30]

B. Policies to Stimulate Early or Sophisticated Demand

Government policies can stimulate early, intense or sophisticated demand for products and services in a less direct fashion, by stimulating demand within an area of social or environment policy, for example, that reflects a nation's broader political, social and economic priorities.

Universal access to major public services has long been a cornerstone of Canadian public policy. This emphasis has led to innovations in several areas. In education, governments have taken the lead in funding the development of correspondence education. Canadian firms and universities are considered world leaders in a number of distance education methods and technologies. Canadian telephone utilities are required to service all communities in Canada, and basic billing rates are tightly controlled to encourage access. As a result, the utilities were forced to develop technologies which enabled them to lower the cost of servicing remote locations. Spar Aerospace's "Annik" satellite technology was developed to satisfy this need, as were tropospheric transmission systems. The Canadian emphasis on cost control in the health care system has fostered strong Canadian expertise in various areas of administrative systems such as inventory control software.

In the environmental field, "monitoring" has long been a priority of various levels of government in Canada. Several firms have emerged to meet the demand for equipment and services. In Alberta, for example, the unusually high sulphur content in the oil and gas fields led to a need for sophisticated monitoring equipment early on, and local suppliers emerged to meet the demand. With the recent surge of environmental regulations and mounting public concern worldwide, international demand for increasingly sensitive measurement technologies has grown dramatically. Alberta-based suppliers of these technologies have since found a ready international market in serving oil producers, power companies, and smelters, where SO_2 emissions have become an issue.

C. Environmental Standards and Regulations

Government can affect demand conditions by promoting the development of high standards for industrial products and processes. Stringent standards for product performance, product safety and environmental impact can help to create and upgrade competitive advantage. They pressure firms to improve quality, develop improved processes, and respond early to consumer and social requirements.

Standards that anticipate international trends are particularly beneficial over the longer run. These can assist in giving firms a lead in developing products and services which will be valued in other markets. Tough standards also encourage the growth of specialized firms which assist in the upgrading process.

Traditional concerns about the enforcement of stringent standards are based on a static view of competition. Strict environmental regulations do not undermine competitive advantage against foreign rivals; indeed, to the extent that they anticipate international trends, they can enhance it. Properly constructed regulatory standards, which aim at outcomes and do not prescribe methods, will encourage companies to re-engineer their technology. The result, in many cases, is a process that is not only cleaner but that lowers costs or improves quality.

The ten-nation study found that German, U.S. or Japanese leadership in environmental technologies frequently occurs in those areas where the countries have the most stringent environmental regulations. For instance, German technology is used in Ontario Hydro's new SO_2 scrubbers for coal-fired generation plants. Similarly, some older Canadian pulp mills are adopting Scandinavian technologies which were developed to meet their local world-leading standards for pulp mill effluent.

While Canada is improving its approach to environmental standards, its overall past record, like many other nations, has been relatively weak. In spite of the inexactitude of some international comparisons and the fact that no nation has a consistently good record, it can be said that most past regulatory standards, whether federal or provincial, have not been anticipatory in a way that could have pushed Canadian companies more forcefully toward innovative processes and strategies.

i) Standards and Jurisdictions

Canada's constitutional structure and the consequent sharing of jurisdictional responsibility have impaired the development of national environmental standards. The provinces have the most influence over environmental standards as a result of their sovereignty over natural resources and jurisdiction over property. Federal jurisdiction is traditionally reserved for issues of interprovincial or international scope.

An issue with provincial requirements is a lack of uniform standards. Instead, many provinces operate through a system of case-by-case control orders.

ii) Overview of Current Standards

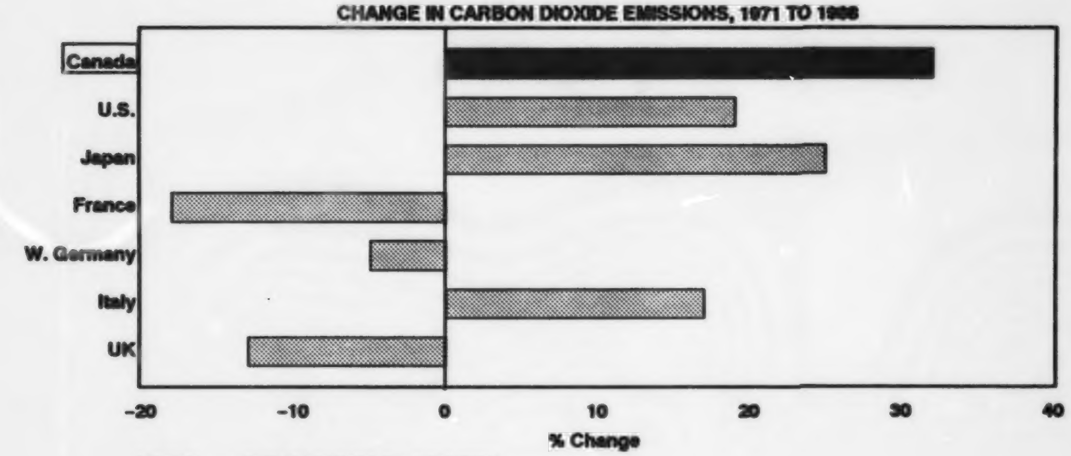
While some standards in Canada have spurred industries to innovate, Canada's standards, and the pace of change in raising standards, has trailed other leading industrial nations in many areas. In this section, we discuss the state of environmental regulation in atmospheric pollution, persistent toxic emissions, water pollution and solid waste management.

Atmospheric Pollution Targets: Concern about the global atmosphere has focused on three issues: greenhouse gases, acid rain, and ozone depletion.

On a per capital basis, Canada is second only to the U.S. in per capita emissions of greenhouse gases. While several European countries have decreased total CO_2 emissions since 1971, Canadian emissions have actually increased (see Figure 7.8). As well, Canada's target for reducing emissions of greenhouse gases in the 1990s is exceeded by ten other OECD countries. Growing dependence on nuclear power in countries such as Germany and France partly explains their success in reducing emissions.

Figure 7.8

CHANGE IN CARBON DIOXIDE EMISSIONS, 1971 TO 1988



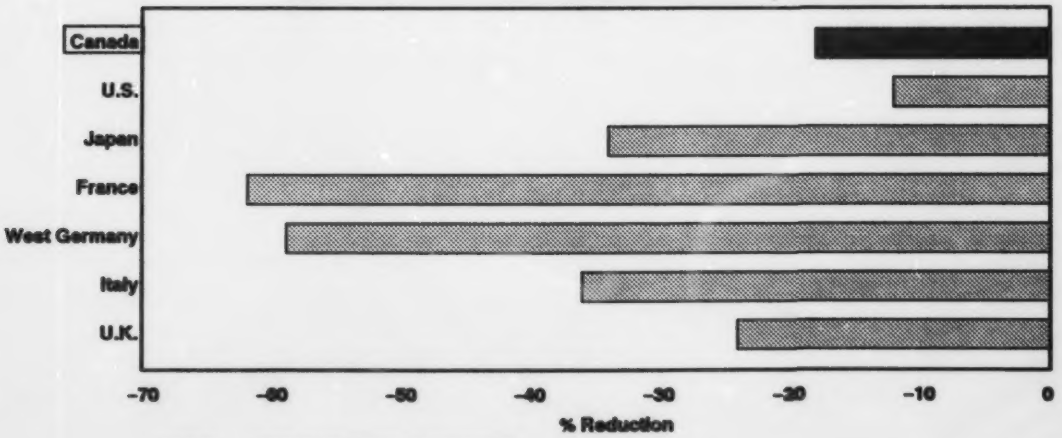
SOURCE: OECD ENVIRONMENTAL INDICATORS

Canada's pattern of emissions is largely a product of its climate, geographic size, and urbanization patterns. It is also another manifestation of the country's reliance on traditional basic factor advantages in the make-up of its industrial structure. Canada's rich endowment of natural resources has led to an energy-intensive economy.

Canada's success in controlling acid rain-causing emissions has been comparatively recent. Its historic record has been relatively poor. As a large exporter of such products as petroleum, nickel and copper, whose production produces acid rain precursors, Canada's absolute levels of sulphur dioxide and nitrous oxides per unit of GDP are correspondingly high. Nonetheless, Canada has failed to reduce its emissions to the same relative extent as other countries. Canada reduced its emissions of SO_2 by about 50 percent between 1970 and 1988, and has committed to reduce 1980 level emissions by another 50 percent by 1994.[31] However, reductions have been smaller than those accomplished by most other OECD countries (see Figure 7.9).

Figure 7.9

REDUCTION IN TOTAL SULPHUR DIOXIDE EMISSION, 1980 TO 1988



SOURCE: OECD ENVIRONMENTAL INDICATORS

Those industries that have been subjected to reduction targets in Canada have demonstrated the positive effects of stringent standards. Tougher regulations in Canada's eastern provinces have had a major impact on the competitive position of several industries. In Quebec, Noranda installed an SO_2 recovery process which produces sulphuric acid as a marketable by-product. In Ontario, Inco modernized its process, which is expected to achieve a 60 percent reduction in SO_2 emissions by 1994. Because Inco's new process uses less energy, production costs will be reduced, as will CO_2 emissions. The oxygen flash furnaces developed by Inco engineers also represent a significant technological advance that should lead to export opportunities.

Canada's national targets for reducing ozone-depleting gases, such as methyl chloroform and CFCs, are also encouraging. Canada was the first country to ratify the 1985 Vienna Convention for the Protection of the Ozone Layer, and was a key player in the updated Montreal Protocol in 1987. The target set by Canada for eliminating CFCs (1997) is among the most ambitious of any country, and is ahead of the schedule laid down in the Montreal Protocol. This undertaking has compelled Canadian firms such as Northern Telecom to pioneer the search for non-CFC solvents used for cleaning electrical equipment.

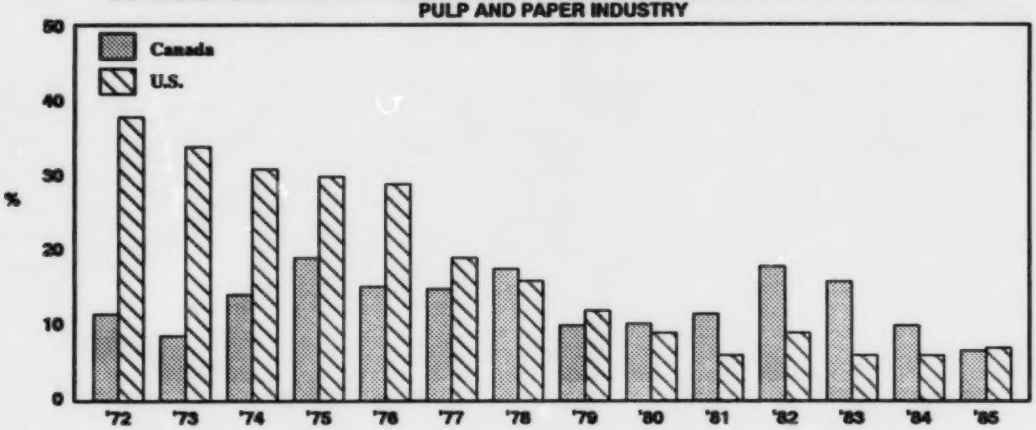
Persistent Toxic Emissions: The development of national Canadian standards for the release of toxic substances affecting air and water has been slow. Since 1976, only 13 toxic substances have been listed in Canada, compared to no fewer than 129 toxic chemicals already subjected to concentration thresholds in the U.S.[32] However, the Canadian Environmental Protection Act is increasing the testing and assessment requirements for new chemicals prior to manufacture; Canada's standards are, therefore, being improved in this area.

Water Pollution: Canada's record of controlling water pollution has been uneven. The pulp and paper industry in Canada, for example, has faced lower standards, on average, than those of the U.S. with respect to Biological Oxygen Demand (BOD), and enforcement has often been weak. BOD regulations passed in the 1970s in the U.S. forced secondary treatment on all pulp mills in that country.

Canada's relative weakness in the area of water pollution standards has slowed innovation in the pulp and paper industry over the past two decades. The rate of Canadian investment in pollution control R&D, up to 1985, showed a marked lag when compared to the U.S. (see Figure 7.10). As a result, American firms have come to dominate the market for secondary treatment facilities, and most new pulping processes now come from Europe.

Figure 7.10

CAPITAL EXPENDITURE ON POLLUTION CONTROL AS % OF TOTAL CAPITAL EXPENDITURES BY PULP AND PAPER INDUSTRY



SOURCE: CONTROLLING POLLUTION FROM CANADIAN PULP AND PAPER MANUFACTURERS, WILLIAM F. SINCLAIR; ENVIRONMENT CANADA

Requirements for secondary treatment of both municipal and industrial sewage -- regulated by provincial authorities -- are also less demanding than in the United States. However, positive initiatives are emerging. Ontario's Municipal and Industrial Strategy for Abatement (MISA) program promises standards for major industry sectors which are intended to be more demanding than those developed under the U.S. Environmental Protection Act.33 Quebec and Alberta have also begun to pursue tighter toxic control regulatory programs.

Solid Waste Management: Per capita waste disposal levels in Canada are more than twice as high as many European countries, reflecting historically weaker standards for controlling waste generation. In addition to the European Community's recent draft directive calling for 60 percent recycling content in packaging materials, Germany continues to raise its packaging recycling standards; proposals also exist for recycling parts of automobiles.

Canada is now responding constructively to solid waste issues. One example is the Canadian National Packaging Protocol goal of diverting 50 percent of packaging from the waste stream. Canadian municipalities have also invested in curb-side recycling programs whose successes have been aided by market-based incentives such as large increases in tipping fees at municipal dump sites. Many businesses have introduced waste reduction programs, producing significant cost savings. An internationally competitive waste consulting industry is emerging. For example, Resource Integration Systems and Recycling Development Corporation have been involved with U.S. cities to introduce Blue Box-type recycling programs initially pioneered in Canada.

iii) Choice of Regulatory Instruments

The effectiveness of existing regulations in Canada has been diminished by the choice of regulatory instruments. Like many countries, Canada has relied predominantly upon "command and control" regulations rather than market instruments. In addition, it has preferred Best Available Technology standards (BAT) over performance standards. These tend to increase the costs of meeting existing standards and reduce incentives for innovation. The economic efficiency of market-based instruments has been demonstrated in several instances in the U.S., most notably in permit trading schemes to reduce lead in gasoline. Tradable quotas for air emissions are also an important feature of the new U.S. Clean Air Act.

Although market instruments have rarely been employed in Canada, the federal Green Plan has proposed a study of their potential application. Greater use of such instruments will be vital to the efficiency of future regulations. The potential for performance standards to encourage innovation was demonstrated by the technology breakthroughs at Inco as a result of tough provincial SO_2 performance targets.

iv) Positive Developments

Recent government initiatives will yield tougher environmental standards in Canada in the coming years. The expansion of national standards outlined in the federal Green Plan promises a regulatory framework that will allow long term planning in industry for cleaner technologies. Canadian governments are continuing to advance the process of effective consultation on environmental issues. In addition, greater use of environmental assessments at the federal and provincial levels will subject a broader spectrum of economic activity to environmental standards.

As governments strive to cope with growing demands for tougher environmental standards, private industry in Canada is playing a more important role. Many industry organizations have recognized the need to develop procedures that anticipate demands for environmental standards in Canada and internationally. For example, the Canadian Chemical Producers Association has broken new ground by developing an industry-wide "Responsible Care" program, consisting of a series of codes or practices relating to environmental management in the chemical industry. This initiative is serving as a model for similar undertakings by the chemical industries in the U.S., Japan and Europe. The Canadian Petroleum Products Institute (CPPI) has a range of technical guidelines for environmental protection which have been well received by government and public interest groups, and have set the pace internationally. As well, codes of practice have been established, or are under development, by the Canadian Petroleum Association, the Mining Association of Canada, and the Canadian Pulp and Paper Association. In most cases, adoption of the code is a condition of membership in the association. In a related initiative, the Canadian Institute of Chartered Accountants is one of the first organizations in the world to develop accounting rules for capital assets that explicitly require companies to make provision for potential environmental liabilities. Such measures will encourage industry to explore practices that will be in increasing demand internationally.

Positive developments have also been taking place in the regulatory process. In the past, environmental groups have expressed frustration with a perceived lack of effective participation in the regulatory process. In certain cases, this has prompted them to take direct action through the courts. In the forest products sector, for example, government and industry have failed to involve public interest groups in setting standards. As a result, an unproductive relationship has evolved: in B.C., where public awareness of forest practices is high, the Council of Forest Industries (COFI) is not on speaking terms with the province's two largest environmental groups. Increasingly, however, there are encouraging examples of improvements in the consultation process. Multi-stakeholder consultations have recently been used in the development of controls on new pesticides, in reductions in urban smog through the NOx/VOC Management Plan and in the National Packaging Protocol to deal with problems of solid waste.

D. Product Safety Standards

Cross-country comparisons of product safety standards are difficult because the patterns of development are frequently irregular. Canada, for example, has banned the sale of saccharin (still in use in the U.S.), but continues to allow the use of various food additives (for example red dye #2) that have been banned in the U.S. for their potentially carcinogenic properties. The general orientation of Canadian safety regulations and standards appears to have been toward "protection" rather than enabling consumer choice based upon informed decisions. Canadian regulation of television advertising, for example, is much more restrictive than in the United States. American regulations appear to place a greater onus on the decision-making capacities of the individual consumer.

Given this orientation toward protection, it is not surprising that a primary focus of Canadian safety standards and regulations has been children and seniors, as well as protection from hidden hazards or "involuntary risks." Canada was among the first countries to establish a comprehensive set of standards for toy safety in the early 1970s, part of which was adopted by the U.S. as late as 1980. Close to half of all product safety regulations currently in effect in Canada relate to products specifically used by children.

American regulations have tended to place more emphasis on ensuring the availability of information, upon which consumers may make their own decisions. The U.S. preceded Canada in mandatory nutrient labelling, for example. Recent legislation requires putting mandatory warnings to pregnant women on the labels of alcoholic beverages. As well, U.S. manufacturers of food products are required to indicate the presence of specific colouring additives; while in Canada, the use of "colour" is sufficient. As a further example, under the existing Pesticides Act in Canada, consumer groups interested in monitoring pesticide safety are denied access to the test data which is filed when active ingredients are registered in Canada. As a result, Canadian groups must go to the U.S., where similar registration data is made public.[34]

However, the generally conservative and protective nature of Canadian regulations has frequently been a source of advantage for Canadian industry. Canadian life insurance companies, for example, have developed a strong reputation for financial stability, which is a key purchase criterion for most prospective policy holders. The origins of that stability can be traced to the stringency of the regulations which governed the industry's development in Canada. Legislation requiring Canadian companies to deposit reserves with the federal government was initially introduced in 1868. Subsequent federal regulations have set strict limitations on the types of investments which insurance companies can make. Canada's largest firms are now considered among the safest in the world. Nine of the ten largest Canadian companies with operations in the U.S. are rated "AAA" in claims-paying ability by Standard and Poor's, with the tenth rated "AA." No federally registered Canadian company has ever defaulted on a payment to a policyholder anywhere in the world.

The Canadian biopharmaceuticals industry has also benefited from safety standards that are among the highest in the world. Vaccines produced by Canadian firms are readily accepted in many countries if approved by the Canadian Bureau of Biologicals. The high quality of Canadian products has reduced the danger of costly liability suits, even in the litigious U.S. market. In fact, two of Connaught Laboratories' U.S. competitors were forced to withdraw from the vaccines market in response to damage claims brought against them by American consumers.

I) The Administration of Standards

There is an important distinction in evaluating product standards between the content of standards and the process of administering them. Competitive advantage is enhanced by stringent standards that are rapidly, efficiently, and consistently applied. These can play the same role as a demanding buyer. Slow or uncertain application of standards, conversely, both wastes resources and undermines innovation. Tough standards combined with an effective process of enforcement represent the best combination for competitive advantage.

Approval Processes: The existence of significant delays in the product approval process has been an issue in both the pharmaceutical and biopharmaceutical industries. In the case of the biopharmaceutical industry, approval delays by the Bureau of Biologicals affected export potential as well as domestic sales, since quick approval processes in importing nations are typically facilitated by domestic approval. The Pharmaceutical Manufacturers' Association of Canada also cites data suggesting that approval processes in Canada are significantly longer than in most other industrialized nations. As discussed earlier, the consistency with which standards are developed and applied has also emerged as an issue in the development of environmental standards.

Enforcement: Stringent regulatory standards are of little use if they are not enforced. In Canada, as in most countries, resources of consumer protection agencies within government have been held constant or are shrinking, while the number and complexity of product offerings in the marketplace have substantially increased. As a result, the adequacy of resources allocated to enforcement has become an issue.

Enforcement difficulties are further complicated in Canada by several other factors. A degree of overlap between the federal and provincial governments exists with respect to product safety and consumer protection. Most product safety legislation at the federal level has traditionally been quasi-criminal in nature; as such, the burden of proof is high and conviction rates low. Reform of existing laws has been slow and, until recently, penalties have been mild.

Effective enforcement may also be hindered by the relatively narrow range of remedial actions available to Canadian officials. Product recalls, for example, cannot be mandated in Canada; they must be initiated by the manufacturer. As well, there are no regulations in Canada, as there are in the U.S., which compel a manufacturer to warn that a product contains a defect that could create a substantial risk of injury.

However, significant change has occurred in recent years. Several high profile prosecutions for misleading advertising have been undertaken, with the courts imposing substantial fines. The nature of legislation is changing, particularly consumer protection laws at the provincial level (as well as environmental statutes both federally and provincially). The concept of strict liability for offenders has been introduced and penalties have been significantly increased, with fines of up to $1 million and jail sentences for officers and directors in the case of the most serious environmental offenses.

Consideration is being given to reforming existing federal laws which, for instance, might mandate product recalls in certain cases, require corrective advertising, and move certain offenses from criminal to civil law proceedings. The federal Department of Consumer and Corporate Affairs is putting new emphasis on softer, although potentially more comprehensive, enforcement measures such as monitoring, education, and industry self-regulation.

ii) Product Liability

Product liability laws can benefit competitive advantage by acting like a sophisticated buyer to encourage the development of better products. However, taken to extremes, they can also retard innovation by putting firms in constant jeopardy of costly and lengthy liability suits, as has happened increasingly in the United States.

Canadian developments in product liability have generally paralleled those of the U.S. By and large, these developments have increased the likelihood of conviction, as well as the size of awards made to consumers. As noted, several provinces have adopted strict liability provisions which have diminished the burden of proof on the consumer. Although Canada has emulated the U.S. trend toward more liability suits, so far it has been spared the worst excesses of the U.S. system.

III) Technical Standards

In Canada, the coordination of technical standards is administered by the Standards Council of Canada (SCC), an arms- length federal Crown Corporation reporting to the Minister of Consumer and Corporate Affairs (CCA). The Standards Council oversees the activities of: five Standards Writing Organizations (SWOs), the largest of which is the Canadian Standards Association; six certification agencies; and fifty-six testing laboratories, most of which are private. On the surface, the Canadian system appears significantly less fragmented than the U.S. system, which supports 580 private standard writing organizations. However, in practice, only 20 American SWOs are responsible for more than three-quarters of the standards developed in the U.S.

Canada is unique for the degree of government support for and involvement in its National Standards System. Ninety percent of the Standards Council's annual operating budget is funded by Parliamentary appropriation. In the U.S., the funding is entirely private; in the U.K. and France, government funding accounts for 17 percent and 40 percent, respectively, of funding. Government representatives sit on most SCC advisory and technical committees.

In general, the standards of these organizations appear well regarded both at home and abroad. (The CSA serves as Canada's representative to the International Standards Organization, and the International Electro-technical Commission.) Their role and importance are likely to grow in the future as Canadian governments continue to emphasize the development of industry-led "voluntary standards".

4. SUMMARY

Home demand has generally not been a source of competitive advantage for Canadian industries. This is, in fact, reflected to a great degree in the industries in which we compete. These industries tend, with some exceptions, to be ones in which sophisticated demand is not the primary driver of advantage. Canadian consumers have not exerted consistently strong pressure for innovation, in spite of their spending power, education, and proximity to the United States. The potential for Canadian consumers to spur innovation has been lessened by their relative slowness to embrace new products -- Canadian consumers are rarely at the leading edge of demand. As well, Canadian consumers have not been vigilant in lodging complaints. Nor has the organized consumer lobby in the country been particularly effective.

Several important factors have detracted from the sophistication of industrial demand. The low-cost orientation of many Canadian firms has frequently resulted in highly price-sensitive buyers. Canadian firms have also demonstrated relatively conservative patterns of technology development; opportunities for suppliers to prototype new products are, therefore, limited. A preference for the use of design rather than performance standards has also impeded supplier innovation and upgrading. Finally, the relatively high levels of firm concentration found in many industries have often worked against the upgrading of competitive advantage.

Turning to the impact of government policy, successful government initiatives to stimulate sophisticated demand conditions have not been common. In procurement, governments' effectiveness in stimulating innovation and upgrading has been constrained by blurred procurement objectives, short planning horizons, restrictions on out-of-province bidding, and a frequent preference for off-the-shelf purchasing. Recent initiatives by the federal Department of Supply and Services have begun to address many of these issues within the federal government, with special attention to the competitive process. Prevailing procurement practices at the provincial level, however, continue to undermine the extent to which government procurement in Canada exerts a positive influence on domestic demand conditions.

In the past, environmental standards in Canada have tended to lag behind those of most industrialized nations and provided little impetus for innovation. The effectiveness of some standards has been compromised by the choice of regulatory instruments. A recent trend toward tougher environmental standards -- as well as progress toward the development of comprehensive national strategies to tackle key issues -- promises to have a positive effect on domestic demand.

Safety standards in Canada have been quite stringent, though rarely anticipatory. However, there is a danger that the effectiveness of strict standards could be compromised by limited capabilities in standards enforcement. The development of sophisticated consumer awareness with respect to product safety in Canada may have been impeded by a bias toward protective regulatory measures, as opposed to a regime based on ensuring the provision of information upon which individual consumers can base their purchase decisions. Despite these caveats, however, it is clear that Canada compares favourably to other advanced countries in the area of product safety and standards.

CHAPTER 8

RELATED AND SUPPORTING INDUSTRIES IN CANADA

The presence of clusters of related and supporting industries affects an economy's capability to upgrade competitive advantage. In this chapter we review Canada's position in related and supporting industries and the extent of clustering, drawing on our empirical findings from the 25 industry studies. We also refer briefly to several other industries and examine government policies relevant to regional development.

We begin by explaining why the presence of home-based competitive related and supporting industries is important, particularly in specialized products and services. We then review the incidence of related and supporting industries in Canada's key export sectors. Finally, we assess the role of selected federal and provincial government policies in facilitating and sustaining the development of industry clusters.

1. IMPORTANCE OF COMPETITIVE RELATED AND SUPPORTING INDUSTRIES

Chapter 3 described the reasons why home-based related and supporting industries stimulate and facilitate innovation and productivity growth. Such industries, especially those providing specialized inputs, machinery, and services, are sources of technology, ideas and skilled human resources. Home-based suppliers are responsive and deliver inputs in a preferential manner. New generations of products are normally tested first in the home market. But mere access to inputs is not the principal advantage, nor are the inputs themselves the most important element transmitted. Suppliers and end-users located in close proximity benefit from short lines of communication, a quick and constant flow of information and an ongoing exchange of ideas and know-how. Such interchange, crucial to the process of improvement and change, is difficult when senior management, core research and sophisticated production facilities are physically and culturally separated. The proximity of home-based related and supporting industries, in contrast, creates powerful spillover benefits (externalities) that speed progress.

Multinational companies internalize one form of externality through their ability to transfer skills and technology across national borders. Indeed, a multinational with a competitive home cluster can transfer the benefits of innovation externalities provided by its home cluster to its foreign subsidiaries in the form of new product designs or new production techniques. But the ongoing focus of innovation remains at the home base. A multinational with a home base in one location will face numerous barriers to tapping into the externalities created in another location because senior management, central research and the most sophisticated production lie elsewhere. Companies can exchange products, components and machines across distance and national borders, but the ongoing interchange and accumulation of know-how among a critical mass of vertically and horizontally related firms provides far more significant linkages.[1]

Failure to develop related and supporting industries is often a symptom of limited investments by core industries in creating advanced and specialized technology, skills, and infrastructure. In addition, procurement practices that stress price minimization over quality and adversarial relations, rather than interchange with suppliers, will stunt the development of competitive supporting industries.

The Danish insulin industry, drawn from the ten-nation study, illustrates the benefits of clustering on innovation.[2] Denmark's competitive barley, meat and yeast industries are suppliers to the fermented insulin industry, forming the nutrient soup of growing organisms for both insulin and the competitive fermented enzymes industry. Fermented enzymes are a supplier to the pig meat industry. The initial demand for detergent enzymes, triggering a new product area, arose from the need to clean smocks in slaughterhouses. Similarly, the insulin and enzyme industries source specialized skilled labour from the dairy industry. Other related industries include dairy, insulin, brewing, fermentation equipment and purification equipment. These industries have formed self-reinforcing clusters of linked, internationally competitive industries.

Italy's footwear industry provides another striking example of the significance of supplier industries to an industry's competitive position.[3] The Italian leather footwear industry sources competitive advantage from internationally competitive suppliers of tanned leather, footwear parts, leather working machinery and international design firms. These firms, located in close proximity, create a flow of information and knowledge that keeps the Italian industry at the forefront of style, new material and process innovation. These same supporting industries provide competitive strength to other industries related to leather footwear, such as leather clothing, handbags and gloves. Design services are also important to the related industries of athletic footwear and après-ski boots. A mutual reinforcement occurs, with new industries evolving that enhance existing clusters.

Interactions within clusters of related and supporting industries can provide a major source of competitive advantage throughout the entire national economy. The presence of clusters of related and supporting industries reflects strong linkages and externalities in an economy and signals a country's ability to form new businesses in fields adjacent to established strengths. This process is one of the primary means through which economies develop.

2. THE NATURE OF CANADIAN CLUSTERS

Canadian industry clusters tend to be both narrow and shallow. Our analysis of Canada's competitive industries, discussed in Chapter 2, found that Canada's leading export industries were heavily concentrated in five broad clusters: forest products, transportation, petroleum and chemicals, metals and minerals, and food and beverages. Within these broad clusters, there was an almost complete absence of competitive machinery and equipment exports. Moreover, specialized inputs were mainly unprocessed commodities.

These findings were corroborated in most of our industry studies. Rarely was a competitive industry nurtured or sustained by the existence of competitive related and supporting industries indigenous to Canada. This in part reflects the lack of competitive industries in certain sectors of the economy, notably semiconductors and computers. However, the shallowness of clusters exists even in Canada's leading export sectors. In many industries studied, several of the inputs crucial to innovation and competitive advantage were imported and not available domestically.

A. Characteristics of Canadian Clusters

i) Lack of Supporting Industries

Supporting industries supply inputs, machinery or services to downstream industries. A recurring theme from the industry studies is the extent to which Canadian firms source machinery and equipment from foreign suppliers. For example, the absence of Canadian production and packaging equipment was noticeable across the entire food and beverage sector. In the metals and minerals sector, a significant amount of mining machinery is supplied by foreign firms. Service industries also form a critical component of related and supporting industries. Weaknesses in supporting services were also evident in some cases. For example, one of the critical inputs to the consulting engineering industry is Computer Aided Drafting and Design (CADD) systems. CADD systems have played a key role in increasing productivity and efficiency in consulting engineering firms, permitting rapid development of original designs, easy modifications, and scenario projections. This supporting industry is not well developed in Canada, because few Canadian systems are commercially available and most equipment is developed and supplied by U.S. firms.

As we have suggested, the presence or absence of world-class machinery and equipment industries provides insights into the nation's level of process technology. Machinery industries also provide a means of developing and spreading technical expertise throughout an economy. In both Germany and Switzerland, world-class machinery firms provide know-how, information, and cutting-edge process technologies across a wide range of industries. Particularly in Germany, competitive machinery industries comprise the backbone of a vibrant and dynamic economy.

The absence of competitive Canadian machinery industries indicates that the country does not possess world-class expertise in a range of process industries, including those that make up a significant portion of Canadian exports. It also helps to explain the slow pace of technology adoption and diffusion in Canada.[4] This does not mean that Canada should adopt artificial measures to promote indigenous machinery industries. The point is that the Canadian environment has not fostered the natural development of these vital industries.

ii) Lack of Related Industries

Related industries are those that have similar technologies, customers or channels, or provide complementary products. Few of the industries we studied have gained competitive advantage from successful related industries in Canada. Human biological products is a stark example of an industry being threatened by the lack of related industries. Canada's pharmaceutical industry is not well developed, and generally cannot fund R&D and marketing activities on the scale necessary to compete in the global marketplace. The result is a lack of critical mass to support the development of human biologicals.

Where competitive related industries did exist, the benefits were striking. This was demonstrated by the important linkages between cobalt radiation therapy equipment and nuclear power generation equipment, between flight simulation technology and equipment control management systems, and between digital PBXs and central office switches.

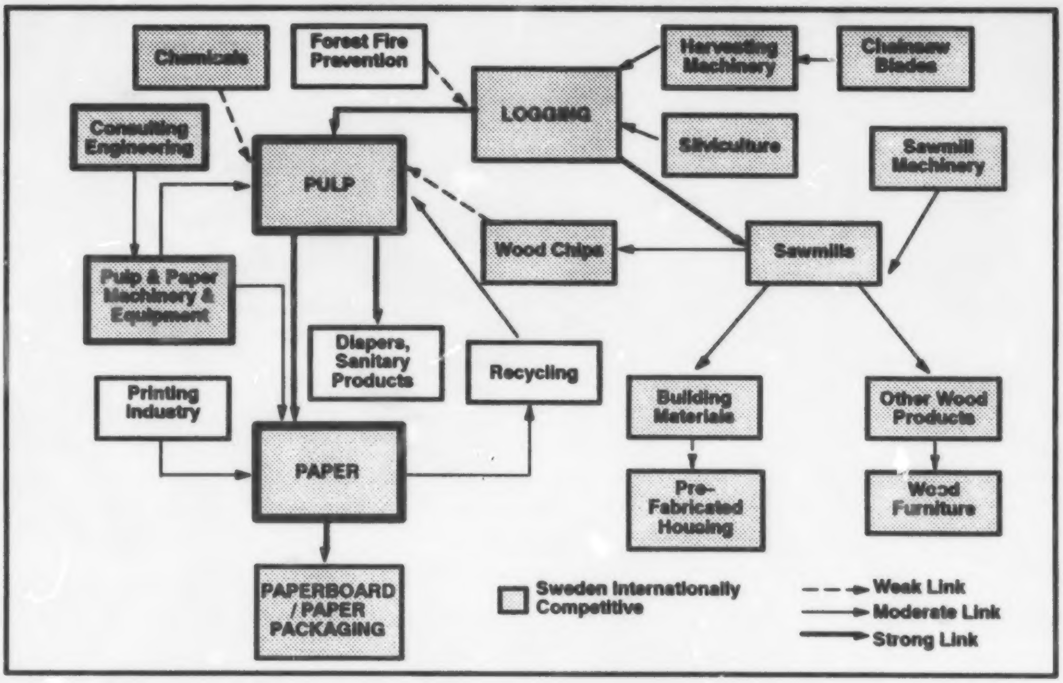
B. Detailed Analysis of Clusters

The following analysis details our findings concerning related and supporting industries by cluster for Canada's five major exporting sectors, which together account for about 70 percent of total exports.[5]

i) Forest Products Cluster

A comparison of the Swedish and Canadian forest products clusters illustrates the relative underdevelopment of related and supporting industries in Canada. The Swedish cluster boasts a wide and deep concentration of related and supporting industries (see Figure 8.1). The sector is Sweden's largest net exporter, and Swedish pulp and paper companies rank among the world's leading exporters. Swedish paper manufacturers are well positioned in newsprint, kraft paper and paperboard. Other competitive Swedish export products include fine papers, tissue papers and wrapping paper, as well as other specialty papers such as bank notes, handmade paper and envelopes.[6]

Figure 8.1
THE SWEDISH FOREST PRODUCTS CLUSTER


Chemicals
Forest Fire Prevention
Harvesting Machinery
Chainsaw Blades
Consulting Engineering
LOGGING
Silviculture
Sawmill Machinery
PULP
Wood Chips
Sawmills
Pulp & Paper Machinery & Equipment
Diapers, Sanitary Products
Recycling
Building Materials
Other Wood Products
Printing Industry
PAPER
Pre-Fabricated Housing
Wood Furniture
PAPERBOARD / PAPER PACKAGING
Sweden Internationally Competitive
Weak Link
Moderate Link
Strong Link

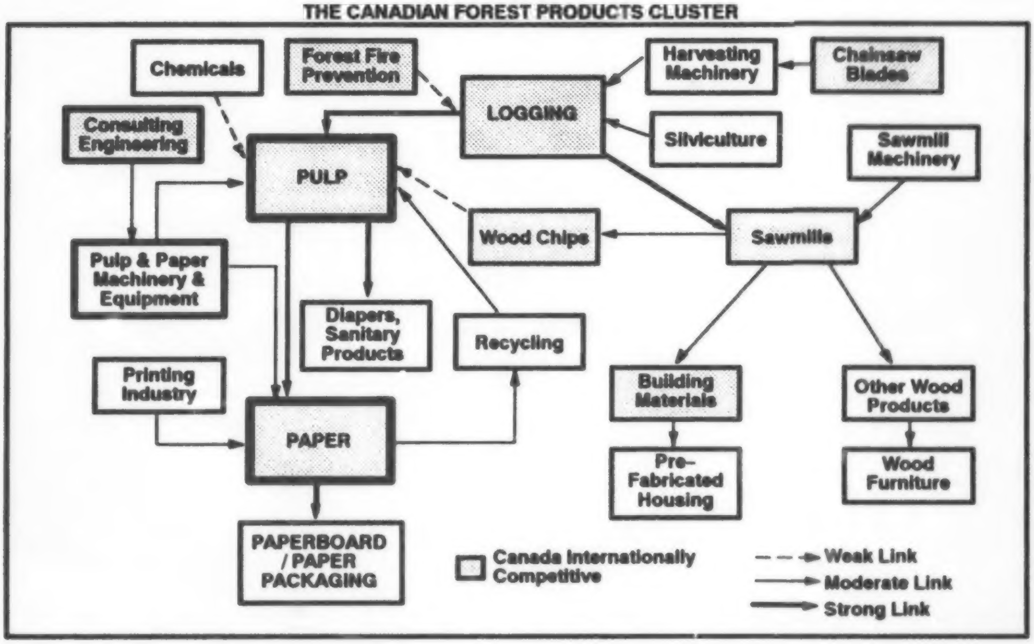
The depth of the supporting machinery industry in the Swedish cluster is also notable and is linked to Sweden's process efficiency and success in advanced segments. Efficient logging has been critical to lowering input costs to pulp manufacturers. Sweden is the home base for a number of leading international machinery manufacturers producing specialty tractors, forwarders, processing machines, log harvesters, thinning machinery and planting machinery. In addition to harvesting equipment, Swedish firms have maintained leading positions in pulp machinery, including bleaching plants, continuous digesters and soda recovery boilers. Associated machinery industries also include wood handlers and conveyors. Although Sweden has lost its former competitive position in paper machinery, the cluster still reflects strong positions in drying machinery and fabric and felts used in paper machinery. Other supporting equipment industries to Swedish pulp and paper manufacturers include distribution, control and drive systems, equipment monitoring instruments and environmental control equipment.

Sweden's competitive transportation equipment industry also supports its forest products cluster. Heavy trucks are used in the transportation of timber and paper, while heavy-duty forklift trucks operate within pulp and paper plants. Other related industries in which Swedish firms have international positions include chainsaws, sawmills (the Swedish sawmill industry is the largest in Western Europe) and some sawmill machinery, prefabricated housing, wooden furniture, hardwood flooring and matches. Finally, the cluster includes certain specialty industries such as chlorate chemical suppliers, and associated industries such as trading houses and shipping companies with special cargo ships adapted specifically for paper shipments.

Unlike the Swedish cluster, the Canadian forest products cluster is relatively narrow and shallow (see Figure 8.2). Canada's leading exports are heavily skewed to sawn wood products, pulp and basic papers such as newsprint.

Figure 8.2

THE CANADIAN FOREST PRODUCTS CLUSTER


Chemicals
Forest Fire Prevention
Harvesting Machinery
Chainsaw Blades
Consulting Engineering
LOGGING
Silviculture
Sawmill Machinery
PULP
Wood Chips
Sawmills
Pulp & Paper Machinery & Equipment
Diapers, Sanitary Products
Recycling
Printing Industry
Building Materials
Other Wood Products
PAPER
Pre-Fabricated Housing
Wood Furniture
PAPERBOARD / PAPER PACKAGING
Canada Internationally Competitive
Weak Link
Moderate Link
Strong Link

Our industry studies revealed the weakness of Canadian-based related and supporting industries.7 The lack of competitive Canadian machinery and equipment manufacturers has made it difficult to forge close working relationships between buyers and suppliers in Canada, and hampered the development and diffusion of leading-edge technologies. Approximately half of Canada's pulp and paper equipment market is supplied from abroad (the industry had a negative trade balance of over $89 million in 1989), with the majority of domestic suppliers being foreign subsidiaries whose research and core production is generally performed outside Canada. The outcome is partly a reflection of the behaviour of Canadian customers. The fact that Canadian mills have not traditionally demanded the most sophisticated production equipment has played a role in diminishing the attractiveness of locating and operating equipment manufacturing facilities in Canada.

Despite a strong sawmill industry, Canada has not built up a commanding international presence in related industries such as wooden furniture. Many harvested logs are packaged in bulk and shipped to Japan. In many other related areas, such as specialty harvesting and transportation equipment, Canada has little international presence. On a more positive note, Canadian pre-fabricated housing manufacturers have enjoyed recent success in penetrating the Japanese market, and now account for approximately half of Japanese imports. There are a few competitive Canadian supporting industries in the cluster, such as forest fire-fighting water bomber aircraft. Canada's presence in chainsaw blades is accounted for by the operations of one U.S. subsidiary's Canadian branch plant (see Figure 8.3).

Figure 8.3

CLUSTERS OF COMPETITIVE EXPORT INDUSTRIES, 1989

	CANADIAN FOREST PRODUCTS CLUSTER	
Primary Goods	Wood Products **WOOD, CONIFER, SAWN** Wood, conifer, rough, untreated *Wood, rough, painted, preserved.* **WOOD, CONIFER, WORKED, SHAPED** **WOOD CHIPS, CONIFER.** Wood chips, non-coniferous Hoopwood; split poles; etc. *Fibreboard, density 0.5-.8g/cm3* *Plywood, soley wood, other* *Non-conifer, veneer, etc.* *Coniferous, veneer, etc.* *Particle board, etc. wood* Casks, barrels, etc. staves *Other articles of wood* **SHINGLES AND SHAKES** Paper **NEWSPRINT, ROLLS, SHEETS** *Other paper, board, 40-150g/m2* **OTHER PAPER, BOARD, UNCOATED NES** *Sack kraft paper, uncoated* Kraft paper, uncoated<150g/m2 *Semi-chemical fluting paper*	Toilet tissue stock, etc. **PAPER,PAPERBD, TARRED, ETC.** Gummed paper, strip, rolls Filter paper, paperboard Pulp **CHEM.WOOD, PULP, CONF. BLEACHED** **CHEM. WOOD, PULP, SULP. BLEACHED** *Chem. wood, pulp, dissolvng* *Chem. wood pulp, n-conif,b* **CHEM. WOOD PULP, SULP. UNBLEACHED** *Chem. wood pulp, conifer* **SEMI-CHEM. WOOD PULP** **MECHANICAL WOOD PULP** Waste *Waste, paper (newsprint)* *Sawdust, wood waste, scrap* Wood-based Chemical Products *Residunl lyes from wood pulp*
Machinery	**CHAIN SAW BLADES** *Cellulose pulp manufacturing machinery*	
Speciality Inputs	**CHLORINE**	
Services		

Key

Modern font	5.1% export share or higher, but less than 10.3% share	nes	Not elsewhere specified
Modern Italics	*10.3% export share or higher, but less than 20.5% share*		
MODERN BOLD	**20.5% EXPORT SHARE OR ABOVE**		

SOURCE: UN TRADE STATISTICS (REVISION 3 PRELIMINARY)

ii) Materials/Metals Cluster

Canada's competitive export industries in this important cluster are concentrated in primary metals and ores, with relatively little presence in fabricated steel or metal manufactures (see Figure 8.4). Canada also exports little related machinery and equipment.[8]

Figure 8.4

CLUSTERS OF COMPETITIVE CANADIAN EXPORT INDUSTRIES, 1989

	CANADIAN MATERIALS/METALS CLUSTER		
	Iron and Steel	Fabricated Iron and Steel	Metal Manufactures
Primary Goods	U,I,H,L,T Sections<80mm, iron Flat. iron, 600 x4.75+mm, coils Flat. iron, 600 x1–3mm, cls Wire, iron, 0.25–0.60%carb Flatn other iron, 600x<4.75mm Lead bar, rod, profiles wire Other angles, etc.hot-rolled Bar, rod, free-cutting.steel Flat.iron 600+mm, other plated Bar,rod,free-cutting.steel Flat oth iron, <600x4.75+mm Semi.fin.iron,etc..25%+c Fl.oth.iron,<600mm Wire, iron, <0.25% carbon Bar, rod, iron, <.60%carbon Bar, rod, other alloy steel Flat. iron,600x<4.75mm, coils **ALLOY PIG IRON, ETC.** **HOLLOW DRILL BAR, ROD, STEEL** **POWDERS, PIG, IRON, ETC.** *Bar,rod,iron, .60%+carbon* Ferro-manganese, 2%+carbon	*Other welded,non-circular tube* Non-Ferrous Metals Zinc alloys Zinc dust, powders, flakes **ZINC, NOT ALLOYED** Refined copper bars, etc. **REFINED COPPER** **ALUMINUM, NOT ALLOYED** **ALUMINUM ALLOYS** *Silver unwrought* Nickel alloys **NICKEL POWDER, FLAKES** **REFINED LEAD, UNWROUGHT** *Platinum, alloys, unwrought* Tin foil <.2mm. powders, flakes	*Articles of lead, nes* *Articles of nickel, nes* Aluminum wire Reservoir, etc. aluminum *Springs, leaves, iron, steel.* *Nails, tracks, etc. iron, steel* Waste and Scrap Tin waste and scrap Magnesium waste, scrap Germanium, articles. wst,scp. *Aluminum waste, scrap* Waste, stainless steel **GRANULATED SLAG** **COBALT, UNWROUGHT, WASTE, SCRAP** *Cadmium, unwright, waste, scrap* **NICKEL WASTE AND SCRAP** *Waste, scrap, prec.mtl nes* *Platinum, waste scrap* *Cermets, articles, waste, scrap* Other base metal, unwrought, waste Other **ASBESTOS** **PEAT** *Articles of peat*
Machinery	*Rock cutter, tunneling machinery* Elevator, underground use		
Specialty Inputs	**MICA, MICA WASTE** **FELSPAR** *Molybdenum ore etc. roast* *Molybdenum ore etc. other* **NIOBIUM, TANTALUM, VANADIUM** *Fluorspar* Iron pyrites, unroasted **IRON ORE AGGLOMERATES**	*Iron ore, concentrate not agglomerated* Dolomite **CRUDE, UNREFINED SULPHUR** **NICKEL MATTES** **COPPER ORES, CONCENTRATES** **COPPER MATTES** **ZINC ORES, CONCENTRATES**	Tin ores, concentrates Cobalt ores, concentrates Base metal ore, concentrates nes **LEAD ORES, CONCENTRATES** **SILVER ORES, CONCENTRATES** **OTHER PRECIOUS METAL ORE, CONCENTRATES** *Bituminous coal, not agglomerated* *Lignite, agglomerated*
Services	**GEOPHYSICAL CONTRACTING***		

Key

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Modern Italics	*10.3% export share or higher, but less than 20.5% share*	*	Added based on in-country research
MODERN BOLD	**20.5% EXPORT SHARE OR ABOVE**		

SOURCE: UN SITC TRADE STATISTICS (REVISION 3 PRELIMINARY)

Although Canada has a position in mining vehicles such as levellers and graders, and in underground mining equipment such as tunneling machinery and elevators, our study of the nickel industry revealed that relatively little competitive strength is derived from independent supplier industries. Most of the mining and mineral processing equipment manufacturers located in Canada are assembly operations of foreign manufacturers, with home bases outside Canada.

In aluminum smelting, there are some competitive local equipment suppliers. Yet a significant proportion of smelting technology is licensed from abroad, and many sophisticated components are imported from France and other countries. Metal fabrication is a relatively underdeveloped industry in Canada. Downstream fabrication industries in both nickel and aluminum are configured largely to supply the Canadian market rather than for export. Alcan's downstream operations, for example, are mainly located in the United States.

Where significant process developments have occurred, they have often been made in-house by the mining companies themselves. A particularly notable success story has been Inco's development of continuous mining equipment through its subsidiary, Continuous Mining Systems.

One of the sector's strongest supporting service industries is geophysical contracting, in which Canada is recognized as a world leader. Historically, large and sophisticated home demand for surveying work from the Canadian mining industry created and sustained a highly competitive supporting industry. The sector has benefited from world-class consulting engineering and specialized contracting and engineering firms based in Canada.

iii) Petroleum/Chemicals Cluster

Canada's internationally competitive industries in the petroleum/chemicals sector are predominantly found in upstream segments. With the exception of polyethylene and polystyrene, Canada does not have a significant international presence in plastics. It has virtually no export presence in related machinery and equipment or in services (see Figure 8.5).

Figure 8.5

CLUSTERS OF COMPETITIVE EXPORT INDUSTRIES, 1989

	CANADIAN PETROLEUM / CHEMICALS CLUSTER		
	Organic Chemicals	Inorganic Chemicals	Petroleum Products
Primary Goods	Oxirane (ethylene oxide) Thiuram sulphides Acyclic hydrocarbons, nes Propyl, isopropyl alcohol Oleic, linoleic acids, etc. *Ethylene, etc., liquified* *Ethylene glycol* *Styrene* Xylenes, pure Benzene, pure Toluene, pure Propene (propylene) Vinyl chloride *1,2-Dichloroethane* **METHANOL (METHYL ALCOHOL)** **SATURATED ACYCLIC HYDROCARBONS** **PENTAERYTHRITOL**	Carbon nes. carbon black Hydrogen, nitrogen, oxygen, rare gas **SELENIUM, PHOSPHORUS** **AMMONIA, ANHYDROUS, ETC.** *Hydrochloric acid* *Sulphuric acid; oleum* **OTHER INORGANIC ACIDS** Sodium chloride, etc. **CHLORATES OF SODIUM** *Sodium sulphates* *Sodium sulphide* Sodium hydroxide, liquid Calcium, strontium, barium **CALCIUM CHLORIDE** *Calcium carbide* *Cobalt oxides, hydroxides* **SULPHUR DIOXIDE** **ZINC OXIDE; ZINC PEROXIDE** Titanium oxides *Carbides, excluding. calcium* Supported catalysts, precious. metal Potassium hydroxide etc. Other chlorides, bromides, iodides **ARTIFICIAL CORUNDUM**	*Crude petroleum* **NATURAL GAS, GASEOUS** **BUTANES, LIQUIFIED** **PROPANE, LIQUIFIED** **OTHER LIGHT PETROLEUM OILS** Plastics *Polyethylene s.g.<0.94* Monofilament, vinyl chloride Ethylere-vinyl acetate copolymers Alginic acid, salts, ester Fabricated Plastics Plastic sacks, bags Other tubes, pipes hoses
Machinery			
Specialty Inputs			
Services			

Key

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MODERN BOLD	**20.5% EXPORT SHARE OR ABOVE**		

SOURCE: UN TRADE STATISTICS (REVISION 3 PRELIMINARY)

By its very nature, the petrochemical sector consists of a large number of horizontally and vertically related industries. In our industry studies we examined the role of related and supporting industries in the competitiveness of styrene, an intermediate petrochemical. The competitive cost position of Canadian styrene production has benefited from efficient benzene production, which is supported by Canada's competitive crude and synthetic oil industries. Even more significantly, the scale and low costs of Alberta natural gas production provide advantages to the ethylene industry, another supporting industry to styrene. Upstream capabilities are enhanced by the presence of the Canadian oil services industry. With limited exceptions -- such as Canadian Fracmaster's joint venture in the Soviet Union -- few services are exported outside of Canada.

Although the styrene industry has been innovative in overcoming certain Canadian factor disadvantages -- such as cold weather, the high sulphur content of sour gas, heavier oils and the difficulties of tar sands production -- most industry R&D activities are centralized in the U.S., and most of the field equipment used is manufactured there.

Canada's competitive position in downstream synthetic resins such as polyethylene and polystyrene is largely driven by foreign innovation. Canadian operations typically adopt the product developments and technology enhancements of their foreign parents. However, Du Pont Canada, which currently holds a worldwide corporate mandate for polyethylene production, is a notable exception. Du Pont Canada licenses its linear low density polyethylene technology worldwide, which allows for the production of different grades of polyethylene in one reactor.

iv) Transportation Cluster

As noted in Chapter 2, approximately 80 percent of Canada's transportation exports are Auto Pact-related. Auto Pact exports amounted to approximately $25 billion in 1989, including both assembled vehicles and automotive parts. Related assembly industries in the cluster include automobile, bus and truck assembly, railway locomotive and rail and freight car assembly, snow-related equipment, and commuter aircraft and helicopter manufacturing (see Figure 8.6). The Canadian-owned firm Bombardier is involved in the manufacture of urban mass transit equipment, snowmobiles, and business and fire-fighting aircraft. It is also currently developing a new 50-seat commuter jet aircraft based on its existing Challenger jet. Other competitive related industries linked to aircraft manufacture appearing in the cluster include flight simulators and navigational instrumentation.

Figure 8.6

CLUSTERS OF COMPETITIVE EXPORT INDUSTRIES, 1989

	CANADIAN TRANSPORTATION CLUSTER		
Primary Goods	Vehicles	Vehicle Equipment	Engines
	DIESEL-ELECTRIC LOCOMOTIVES *Rail, tram. freight cars* **FLIGHT SIMULATORS, ETC. PARTS** *Aircraft, ULW 2001-15000 KG* *Helicopters, ULW <=2000kg* Helicopters, ULW >2000 kg **GOODS VEHICLES, NES** *Road tractor, semitrailer* Passenger transport vehicles Public-transport, diesel engines **OTHER PUBLIC-TRANSPORT VEHICLES** *Snow vehicle, golf carts etc* *Snow-ploughs, snow-blowers* (ULW = Unladen Weight)	Solid tire, interchangeable tread *Tires, pneumatic new aircraft* *Bodies, tractor, transportation vehicles* Navigational instruments **MOTOR VEHICLE SEATS** Materials Handling Equipment *Other vehicle jacks, hoists* Other winches; capstans Construction Equipment Self-propelled. construction, mining machinery Other construction and mining machinery not propelled *Graders and levellers*	**TURBO-PROPELLER ENGINES** *Internal Combustion. piston engines >1000 cc* Other than turbo-jet engines
Machinery	*Injection molds for rubber*		
Specialty Inputs	Rubber Goods	Parts	Other
	ISOBUTENE-ISOPERENE RUBBER *Vulcanized cellular rubber, etc* *Reclaimed unhardened rubber* *Rubber compound, carbon black* Rubber tube, reinforced textile Acrylonitrile-butadiene rubber Butadiene rubber	Bulldozer, angledozer blades *Intake air filters Internal Combustion. engines* *Laminated safety glass* **BUMPERS, PARTS TRACTOR, ETC.** **OTHER FITTINGS ETC. VEHICLES** *Parts, rail locomotive. etc.* *Other parts, vehicle bodies* *Brakes, servo-brakes parts* Under-carriages, parts Parts, navigational instruments Other parts aeroplanes etc.	Tire cord fabricated nylon etc. Anti-knock preparations
Services	Transit management and design consulting*		

Key

Modern font	5.1% export share or higher, but less than 10.3% share	nes	Not elsewhere specified
Modern Italics	*10.3% export share or higher, but less than 20.5% share*	*	Added based on in-country research
MODERN BOLD	**20.5% EXPORT SHARE OR ABOVE**		

SOURCE: UN TRADE STATISTICS (REVISION 3 PRELIMINARY)

Competitive supporting industries to automotive assembly operations include automotive parts and components such as tires, seats and engines. Canada, however, has an overall trade deficit in automotive parts.

From our industry studies of automotive assembly, automotive parts, urban mass transit rail equipment, commuter aircraft and flight simulators, it appears that most of the specialty machinery and equipment used in domestic assembly operations is sourced from outside Canada. While the automotive assembly operations source many parts from local supplier industries, the other transportation industries rely quite heavily on imported components and inputs from mainly U.S. suppliers. Canada has a negative trade balance in these supplier industries, and many significant and technologically complex components are sourced from abroad.

v) Food and Beverage Cluster

Canada's exports in this sector consist mainly of basic foodstuffs that have undergone little processing. Canada's cluster in processed foods and beverages is shallow (see Figure 8.7). The cluster chart shows that Canada has competitive industries in certain agricultural machinery equipment, chemicals and animal feeds. Our industry studies in this cluster covered beef processing, fish processing and whisky. Overall, the few related and supporting industries that are local have not been sufficient to bolster the international competitive positions of these industries.

In beef processing, Canada's supporting industries -- which include slaughtering, processing machinery and packaging machinery -- are not internationally competitive. These industries also support the related industries of pork and chicken processing. Most processing and packaging equipment is imported from the U.S., Japan or Germany. Plant operating costs are significantly higher in Canada as a result of smaller scale facilities and lower production volumes.

There is, however, a small grouping of successful related agricultural machinery industries. Prairie farming has benefited from a strong machinery position in cultivators and weeders (including chisel plows, rod weeders and air seeders), with most Canadian equipment exports bound for the U.S. Canada had a positive trade balance of over $112 million (in U.S. dollars) in cultivators and weeders in 1989. All full-line Canadian agricultural equipment manufacturers, however, are U.S.-owned, and Massey-Ferguson, now renamed Varity, no longer produces any agricultural equipment in Canada. Canada had a trade deficit in combine harvesters and weeders of over $100 million in 1989. In fact, Massey-Ferguson transferred its home base for combine harvesters to the U.S. over 30 years ago; its successor firm, Varity, recently relocated its small head office to the United States.[9]

In fish processing, the industry benefits from a skilled and relatively well-equipped offshore fish harvesting fleet. However, virtually all of the advanced fishing gear used by the fleet is foreign-supplied, with the exception of communications equipment. Similarly, the majority of processing equipment used in the industry is not of Canadian origin. Automated processing equipment is mainly supplied by Baader of Germany, freezing equipment (which had a trade deficit of $108 million in 1989) is sourced from U.K. manufacturers, and packaging equipment (a negative trade balance of $64 million in parts alone in 1989) is purchased in the United States.

The situation is similar for whisky production and packaging. Canadian equipment manufacturers are usually subsidiaries of U.S. firms, such as TRI Canada, which distributes steel pipes, tanks and evaporators, or Foxboro Canada, which is the leading distributor of level, temperature and pressure sensors. Other relevant supporting industries to the whisky brands include marketing and advertising services, in which Canada has no unique advantage compared to the U.S. and the United Kingdom.

Figure 8.7

CLUSTERS OF COMPETITIVE EXPORT INDUSTRIES, 1989

	CANADIAN FOOD/BEVERAGES CLUSTER				
Primary Goods	Basic Foods **CRUSTACEANS, NOT FROZEN** *Other crustaceans, frozen* Salmon, fresh, chilled *Salmon, frozen ex.roe* *Other fish, frozen ex.roe* Other fish, fresh, chilled. ex.roe Herring, sardines, fresh chilled, ex. roe Cod, fresh, chilled ex. roe *Cod, frozen ex.roe* Flat fish, fresh, chilled ex.roe Fish, livers, roes, frozen **FISH MEAT EX. FILLET FROZEN** **FISH FILLETS, ETC. FRESH CHILLED** *Fish fillets, frozen* **OTHER FISH, SALTED**	*Other molluscs, fresh, chilled* *Other molluscs, frozen, dry, salted* **MAPLE SUGAR, MAPLE SYRUP** **OTHER FRUCTOSE** **GLUCOSE, 20%–50% FRUCTOSE** **LENTILS, DRIED, SHELLED** **MEAT OF HORSES, MULES, ETC.** **NATURAL HONEY** Maize (corn) starch *Sweet corn, frozen* *Other fruit, nuts, frozen* *Beans, ex.broad, horse, dry, shelled* *Other vegetables, unpickled, frozen* *Bovine animals, pure, breeding* *Other bovine animals*	Poultry, live, to 185g Egg albumin Egg, unshelled; yolks, dried Edible offal sheep, horse, frozen **EDIBLE OFFAL, SWINE, FRESH, CHILLED** Edible offal, swine, frozen Potatoes, fresh, chilled Potatoes, unpickled, frozen Malt, including malt flour Swine, pure, for breeding *Other live swine* Swine meat, fresh, chilled Meat of swine, frozen	Processed Foods **FISH LIVER, ROE, DRIED, SMOKED** *Crustaceans, prepared, preserved, nes* Fish, smoked **SALMON, WHOLE PIECES, PREPARED, PRESERVED FILLETS, DRIED, SALTED COD, SALTED** Other cocoa prepared. over 2kg Peas, dried, shelled Sweet corn, prepared, preserved Other bread, baked goods Toasted bread, etc. *Mustard* *Other meat, offal flour* *Homogenized cooked fruit* Other rolled, flaked grains *Bellies (streaky)*	Edible Oils *Rape, colza etc. oil, refined* Rape, colza etc. oil, crude Linseed oil, crude Fats other animals, etc. Beverages Beer etc. made from malt *Whisky*** **COMPOUND ALCOHOL PREPARATION** *Tomato juice* Mixture, fruit, vegetable juices
Machinery	Agricultural Equipment **CULTIVATORS, WEEDERS, ETC.** *Other agricultural etc. machinery* *Ploughs* *Seeders, planters etc.* Other soil preparation machinery etc. *Parts, soil preparation machinery* Dryers, agricultural products Poultry–keeping machinery				
Specialty Inputs	Agricultural Chemicals *Urea* Urea, ammonium, nitrate mix *Ammonium nitrate* *Ammonium sulphate* *Mono–, Diammonium phosphate* **POTASSIUM CHLORIDE** **POTASSIC FERTILIZERS, NES**	Cereals / Seeds, Etc. **DURUM WHEAT, UNMILLED** *Barley unmilled* **BUCKWHEAT, UNMILLED** *Other wheat, meslin, unmilled* **OATS, UNMILLED** **UNMILLED RYE** Cereals, unmilled, nes *Groats, meal other cereals* **RAPE OR COLZA SEEDS** **OIL–CAKE, RAPE, COLZA SEEDS** **LINSEEDS** **MUSTARD SEEDS** **CANARY SEEDS, UNMILLED** *Seeds, other forage plants*	Animal Feed *Bran, etc. wheat* **BRAN, ETC. OTHER CEREALS** **LUCERNE (ALFALFA)** *Brew, distilled dregs, waste* Vegetable residues etc. Fodder roots, forage, etc. Other **BOVINE SEMEN** Animal products, nes *Products of fish, etc. inedible*		
Services					

Key		
	Modern font	5.1% export share or higher, but less than 10.3% share
	Modern Italics	*10.3% export share or higher, but less than 20.5% share*
	MODERN BOLD	**20.5% EXPORT SHARE OR ABOVE**

ex.	Excluding
nes	Not elsewhere specified
*	Added due to FDI
**	Upgraded due to FDI

SOURCE: UN SITC TRADE STATISTICS, (PRELIMINARY)

C. Causes of Weak Related and Supporting Industries

Several factors have contributed to the weakness of Canadian related and supporting industries: a preference to source from abroad, a high degree of internal integration, underdeveloped linkages among diamonds, and the limited size and sophistication of Canadian operations.

i) Sourcing from Abroad

Historically, Canada's reliance on foreign capital brought with it a degree of dependency on foreign entrepreneurs and access to supporting industries in Britain, France and --especially since the 1920s -- the United States. Canada has tended to supply basic inputs for further processing in foreign markets, while acquiring equipment and technology from abroad.[10] To a degree, this was a logical arrangement. Even with the increase in manufacturing performed within Canada, much equipment entered the country duty-free. Foreign firms, particularly those based in the U.S., had existing supplier relationships. Depending upon the transportability of the input or service, many firms maintained their existing outside-of-Canada supplier relationships. Overall, there has been relatively little attention given to developing indigenous supplier relationships.

For many companies, competitive suppliers are frequently found near their relevant home base, usually in the United States. For example, Seagram accesses the advertising services needed for its worldwide whisky brands in New York City, rather than in Montreal. Similarly, although about 70 percent of the value of Boeing de Havilland's Dash 8 commuter aircraft is of Canadian origin, approximately half of all components not manufactured by de Havilland itself are acquired from suppliers located outside Canada. Likewise, about half of the components used to manufacture Pratt & Whitney Canada's small gas turbine engines are supplied from the United States.

As discussed earlier, in the hard rock mining industries, much equipment employed by Canadian firms is not of Canadian origin or design. Consequently, Canadian firms have relatively little ownership of the important technologies, particularly in those segments where technology changes rapidly. Some mining and metallurgical machinery is manufactured within Canada, although often by assembly plants of foreign-owned firms such as Atlas Copco (Sweden), Ingersoll-Rand (U.S.) and Tamrock (Finland). Some foreign manufacturers, however, do see Canada as an appropriate manufacturing base from which to serve the whole North American market. A case in point is the Finnish equipment manufacturer Tamrock, which recently expanded an assembly plant in Sudbury. While basic inputs are sourced from within Canada, the key technology and assembly operations associated with the most sophisticated part of the machine, the drill face cutter, currently remain located in Finland. However, some domestic firms, notably Inco and Sherritt Gordon from our industry sample, have been successful at licensing process technology abroad.[11]

Compared to their foreign competitors, Canadian equipment manufacturers are often smaller and are at a disadvantage in terms of technology, distribution channels and financial stability. In the course of our industry studies, several international procurement officers with multinational companies commented on the weaker or less developed capabilities of Canadian suppliers relative to other international sources.

In the oil and gas service industry, foreign investment drew with it existing supplier relationships with foreign service firms such as Schlumberger. Although there are competitive Canadian firms, the Canadian oil field services industry is predominantly domestically-oriented.[12] Canadian buyers do not always have to rely on foreign services, as illustrated by the geophysical contracting industry, where the foreign subsidiaries have sustained indigenous Canadian research and development. However, it is significant that Canadian ownership is much higher in the mining industry than in oil and gas.

One of the few cases seen in our industry studies where a foreign-controlled company elected to locate a home base for its worldwide business in Canada is the industrial explosives industry. ICI of the U.K. first invested in industrial explosives operations in Canada in 1899. The Canadian domestic market, particularly in mining applications, continues to be one of the most demanding in the world for high performance industrial explosives. The success of Canadian gold mining and other mineral ore extraction industries was assisted by the development of world-class explosive performance in Canada. The combination of rock types, high Canadian labour and safety costs, and remote, inhospitable blast sites makes Canadian mines an ideal test bed for advanced developments in industrial explosives. Significant local R&D and supporting industries have contributed to the competitive position of this industry.

ii) Vertical Integration

One method by which Canadian-controlled firms have compensated for a relative lack of competitive related and supporting industries is by integrating backward. Without the benefits of either an existing foreign supplier network or a local supply base, some firms have chosen to develop their own supply capabilities. However, this carries its own risks and decreases the potential for linkages between related and supporting industries in the economy. If buyer firms are already sourcing from abroad, or have backward integrated into their own supply operations, there is less incentive for a potential new local supplier to enter the industry, particularly if there are only a few buyers. As a result, while vertical integration has yielded benefits for some Canadian industries, the wider diffusion of benefits associated with strong related and supporting industries has been limited. The lack of suppliers also makes entry into the downstream industry more difficult, reducing rivalry.

In the central office switch industry, Northern Telecom has backward integrated into proprietary integrated circuits in order to control a major source of competitive advantage.[13] However, the company does source basic circuit boards from Circo Craft, a Canadian supplier with three production facilities in Quebec, and one of the largest manufacturers in North America. Software programming capability has also been developed internally at Northern Telecom. Most other supply inputs are generic, such as robotics, testing equipment and standard microprocessors, and are usually sourced outside Canada.

Similarly, another of Canada's leading innovation-driven firms, CAE Electronics, the Montreal-based world leader in commercial flight simulators, has effectively built up its own supply industries in response to a lack of Canadian capability. Through the manufacture of its own hydraulic systems, for example, CAE Electronics has made backward integration work to its advantage. First, it is able to build more differentiation through manufacturing higher CAE content into its product. Second, it has moved the firm into other related areas of aerospace and electronics. For example, through the development of simulation technology, CAE has built up its own internal capability in the related field of control systems. A high profile related activity is telerobotics: the sophisticated hand-controlled equipment extension, the Canadarm, was built by CAE in conjunction with Spar Aerospace. In addition, the flight simulation business benefits from CAE's capabilities in supervisory control and data acquisition networks such as air traffic control systems, as well as in energy management systems including direct computer control and power plant simulators.

iii) Underdeveloped Linkages among Diamonds

As discussed in Chapter 3, the determinants interact as a dynamic system. One reason for underdeveloped clusters in Canada is weak specialized factor creation mechanisms, which were identified in Chapter 6. In particular, successful supplier industries are often very knowledge or technology intensive.

Of the 25 industries studied, only a few had advantages in several of the determinants -- including nickel, industrial explosives, consulting engineering, geophysical contracting and electrical power generation.[14] For example, Canadian consulting engineering firms provide world-class engineering, procurement and construction management services that strengthen the related and supporting determinants in the other industries' diamonds. In mining, and nickel in particular, consulting engineering and contracting suppliers support all parts of the industry, including drilling, boring and shaft sinking and engineering and construction management services.

Canada's ability to develop its hydroelectric and thermal energy sources has benefited from, and provided demand for, world-class engineering consulting services. These, in turn, have helped support the development of other natural resource industries. Hydro-Quebec has been a demanding user of external consulting services. As a result, the consulting engineering industry's major geographic concentration is around Montreal. Other resource industries which are energy-intensive, such as forest products and aluminum smelting, draw competitive advantage from Canada's position as a world leader in electric power generation and high voltage distribution technologies that include overhead and underground cables and portal structures. Similarly, Canada has a competitive wire and cable manufacturing industry to support the distribution utilities. Strong links exist among these industries. The nickel industry, for example, is supported by Canada's internationally competitive capabilities in industrial explosives, geophysical surveying, consulting and construction engineering, and in the generation and distribution capabilities of Canada's electricity cluster, which provides cheap and reliable electrical power.

In contrast, most of the other industries studied are characterized by weaker diamonds. In the commuter aircraft industry, for example, Canada might be expected to have a particularly strong cluster of supporting industries, given its significant share of world exports. In fact, competitive Canadian supporting industries include engines, landing gear (Dowty Aerospace Canada) and flight instrumentation (Bendix Avelix). However, many key inputs are sourced outside Canada, such as climate systems and propellers (Hamilton Standard), fuel systems (Lucas and Lear-Siegler) and radar (Sperry).

Canada's commuter aircraft assembler, Boeing de Havilland, has derived little specific competitive advantage from local Canadian supplier industries. Although one of the major supporting industries to the Dash 8 commuter aircraft series is Pratt and Whitney Canada (turboprop engines), this relationship does not appear to be any stronger than those which Pratt and Whitney Canada has fostered with engine customers outside Canada. Geographically separated -- Boeing de Havilland is located north of Toronto, and Pratt and Whitney south of Montreal -- the two companies are not collaborating on a new, larger turbo-prop engine for de Havilland's proposed stretch 70-seat Dash 8-400 series. Instead, Boeing de Havilland is considering using engines from U.S.-based General Electric or Allison General Motors.

Pratt and Whitney Canada itself sources many of its engine parts not from aerospace firms within the Montreal cluster but rather from other locations, particularly the United States. For example, most nickel and titanium alloys used in turbine blades, specialized machinery, precision forging and vacuum castings are purchased in the United States. Equally significant, Pratt and Whitney Canada benefits from technology transfers in key areas such as materials R&D and machinery technology from its U.S.-based affiliates.

iv) Buyer Behaviour

The development of supporting industries is heavily influenced by the nature of buyer activity. Some of our industry studies found that limited activity within the Canadian market has prevented the development of the critical mass of demand required to spawn competitive, indigenous supporting industries. Limited market size alone is not a sufficient explanation of this phenomenon. A number of other small and mid-sized economies -- for example, Switzerland and Sweden -- have developed deeper and stronger clusters, which include machinery and equipment supply industries. Product innovation can be hampered by a lack of critical mass of supporting industries. For example, even the world-leading Canadian ice skate industry has on occasion found product innovation hampered by a lack of indigenous supporting industries. When Canstar sought development assistance with a new figure skate, Du Pont Canada referred Canstar to its U.S. parent because it lacked the breadth of technical capability in Canada.

D. Geographic Concentration in Canadian Industries

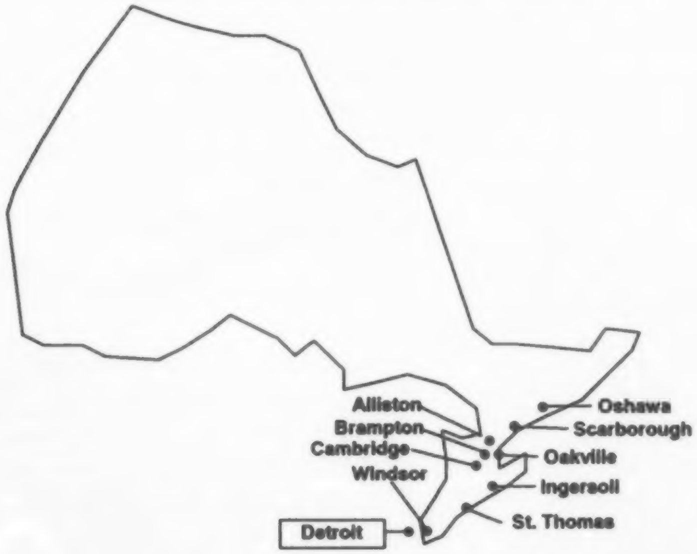
A principal finding of the ten-nation study was that competitive clusters are often concentrated geographically. Geographic concentration improves externalities and fosters more entry into supplier industries. In Canada, and Ontario in particular, large clusters of manufacturing industries exist in and around the major population centres, with over two-thirds of Canada's manufacturing employment located in the corridor between Windsor and Quebec City. In principle, Canadian manufacturing should be well positioned to benefit from the advantages of geographic clustering.

i) Automotive Industries

The automotive assembly and the supporting automotive parts industries represent the largest geographic cluster in Canada. All Canadian-based assembly operations of the big three U.S. auto makers are located in Southern Ontario, except for one GM plant in Quebec. All of the foreign joint-venture and transplant facilities are also located in Southern Ontario with the exception of Hyundai's plant in Quebec and Volvo's small facility in Nova Scotia.

Figure 8.8

AUTOMOBILE ASSEMBLY PLANT LOCATIONS IN ONTARIO



Most automotive parts firms are located in close proximity to these assembly plants. Tool and die supporting industries are heavily clustered in the Windsor area. The highest proportion of intra-firm imports between the U.S. and Canada is found in automotive products, reflecting transfers of parts and assembled vehicles between the Southern Ontario cluster and the nearby U.S. cluster radiating out from Detroit.

However, the potential advantages of geographic clustering appear to have been diminished as a result of the lack of home bases in Southern Ontario and the close proximity of the Canadian industry to the centre of the U.S. cluster in Detroit. Because the Canadian industries represent adjuncts to the U.S. automotive cluster, critical upgrading activities and R&D operations are frequently based in the U.S., not Canada.

ii) Resource Industries

Natural resource-based industries are located at the source of the raw material. Clearly, this can limit the potential for concentation. The fish processing industry is based in many port towns along both coasts. In the forest products sector, pulp and paper mills are scattered throughout Quebec, Ontario, the Atlantic provinces, and British Columbia. This dispersion has hindered the development of competitive Canadian related and supporting industries.

Another barrier is government policy. A number of subscale fish processing plants are spread throughout Atlantic Canada in part because governments' desire to sustain employment has hindered attempts to consolidate operations. Oil and gas exploration and extraction is clustered in Alberta and Saskatchewan, with some limited activity in B.C. and, more recently, off the coast of Newfoundland. Refining activity is concentrated in Alberta, Sarnia (Ontario) and Montreal (Quebec).

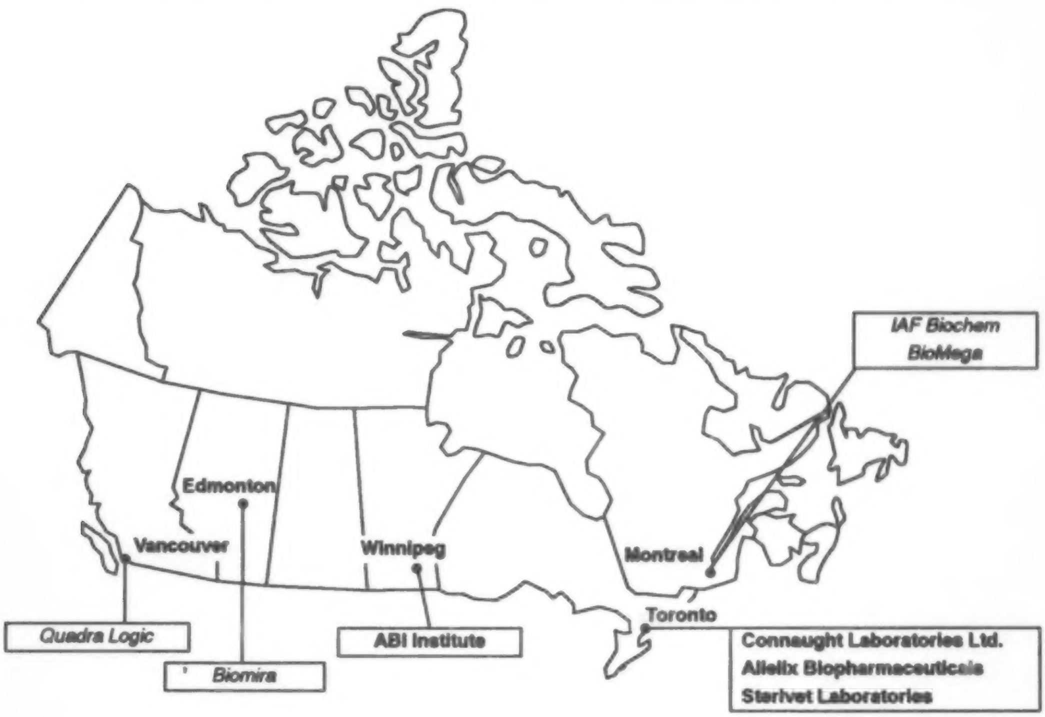
Examples that illustrate the benefits of geographic concentration are the nickel industry, concentrated in Sudbury, and the aluminum smelting industry, located in close proximity to hydroelectric supplies in Quebec. Related and supporting industries have formed around Sudbury, attracted by the nickel industry's concentration there. Located in both the Sudbury and Toronto areas, these include Inco's machinery subsidiary Continuous Mining Systems, and engineering and contracting firms such as Dynatec and Redpath. The Ontario Ministry of Northern Development and Mines is based in Sudbury, as are the Centres for Rock Mechanics and Mining and Mineral Exploration Research (both located at Laurentian University) the Haileybury School of Mines and Cambrien College. The result is a successful cluster.

iii) Other Industries

The Canadian human biological products industry has remained geographically dispersed, and thus has failed to develop or to benefit from critical mass. Historically, the industry developed in Toronto around Connaught Laboratories at the University of Toronto and in Laval around the Institute Armand Frappier (IAF) at the Université du Québec. This is unlike countries such as Switzerland or the U.S., where knowledge-intensive, pharmaceutical-related research tends to be concentrated in Basel and

Philadelphia/New Jersey respectively. Government policy has contributed to this. In approving the foreign acquisition of Connaught by France's Institut Merieux, the federal government required that the firm develop a bio-sciences centre in Toronto. Similarly, the Ontario Development Corporation has contributed to the funding of research activities of Allelix Biopharmaceuticals in Toronto. In Montreal, the Quebec government has been active in pressing for the creation of a bio-technology centre at the IAF site; in the past it was also involved in providing funding to another firm, BioMega. Well removed from the Montreal and Toronto-based activities, Quadra Logic Technologies Ltd., one of Canada's most prominent research firms, is located in Vancouver. This reflects its close association with the University of British Columbia.

Figure 8.9
HUMAN BIOLOGICAL PRODUCTS INDUSTRY EXHIBITS A LACK OF GEOGRAPHIC CLUSTERING



This dispersion of bio-pharmaceutical firms has likely worked against the development of strong related and supporting industries. Virtually all supply inputs to this industry are sourced from Europe or the U.S., including fine chemicals, most basic biologics, and fermenters for production. Even simple products such as vials and rubber stoppers are imported from the United States.

The larger related Canadian pharmaceutical industry is also underdeveloped. As a result of this pattern, most industry participants believe that joint ventures or mergers will be essential, and that most of the Canadian firms will have to be acquired by, or form strategic partnerships in order to survive. Canadian firms have already teamed up with foreign partners: France's Institut Merieux in the case of Connaught, the U.K.'s Glaxo in the case of IAF Biochem, and the U.S.'s Cyanamid for Quadra Logic. Forging linkages with related and supporting industries is critical to a high technology industry such as biological products, because opportunities to work closely with suppliers on new technologies are vital.

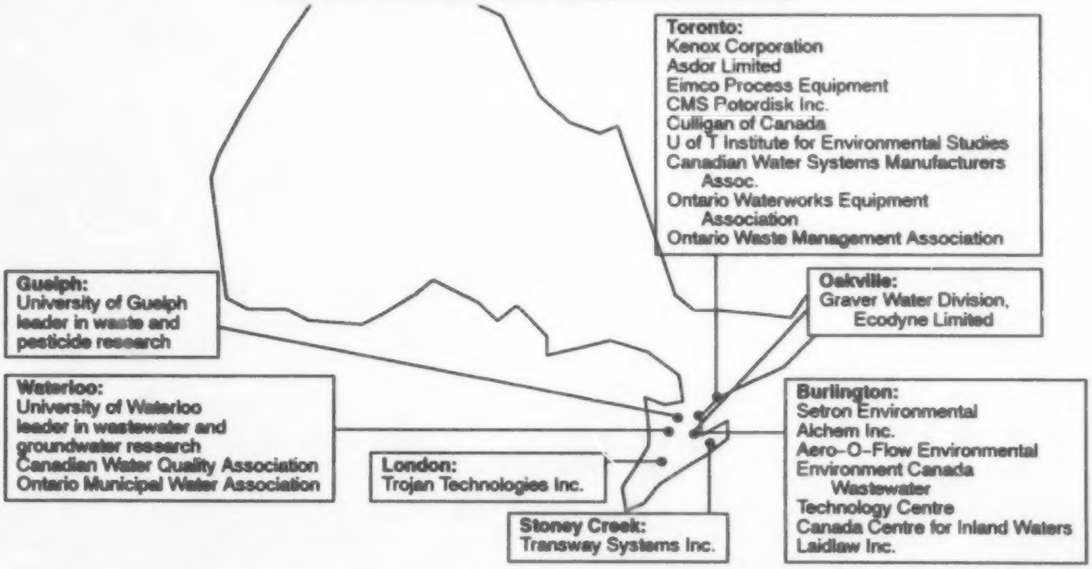
An example of the benefits of geographic clustering is provided by the formation of the National Research Council in Ottawa. Over the past 30 years the NRC has attracted many of Canada's leading technology-based companies to the area around Ottawa, Nepean and Kanata. Industries that have chosen to locate technology development and manufacturing in this cluster include telecommunications (Bell Northern Research -- which has the largest R&D laboratory in the private sector -- Gandalf, Mitel and Northern Telecom Electronics) and aerospace (Lockheed and Canadian Astronautics).

Although Canada's solid and hazardous waste industry diamonds are relatively weak, the wastewater treatment industry provides another good example of a reinforcing cluster. Key industries and infrastructure are located in the Golden Horseshoe area at the southwest corner of Lake Ontario. Drawn by the problems of polluted water in the Hamilton harbour area (problems associated with steel manufacturing discharges), and by a strong research and engineering infrastructure, many of Canada's leading firms in this industry are now clustered in a compact geographical region (see Figure 8.10). Environment Canada's Wastewater Technology Centre and the Canada Centre for Inland Waters are both located in Burlington, while a world-class Centre for Groundwater Research is centered at the University of Waterloo. The Canadian Water Quality Association and the Ontario Municipal Water Association are also based in Waterloo. The proximity of the leading firms and institutions has been a strong factor in the successful development of this specialized industry.

Figure 8.10

WASTEWATER CLUSTER

LOCATION OF LEADING COMPANIES/INFRASTRUCTURE


Toronto:
Kenox Corporation
Asdor Limited
Eimco Process Equipment
CMS Potordisk Inc.
Culligan of Canada
U of T Institute for Environmental Studies
Canadian Water Systems Manufacturers Assoc.
Ontario Waterworks Equipment Association
Ontario Waste Management Association
Guelph:
University of Guelph leader in waste and pesticide research
Oakville:
Graver Water Division, Ecodyne Limited
Waterloo:
University of Waterloo leader in wastewater and groundwater research
Canadian Water Quality Association
Ontario Municipal Water Association
London:
Trojan Technologies Inc.
Burlington:
Setron Environmental
Alchem Inc.
Aero-O-Flow Environmental
Environment Canada Wastewater Technology Centre
Canada Centre for Inland Waters
Laidlaw Inc.
Stoney Creek:
Transway Systems Inc.

3. THE ROLE OF GOVERNMENT POLICY

Given the weaknesses revealed in Canadian related and supporting industries, it is important to examine the impact of past federal and provincial government policies on the development and nurturing of industry clusters. Government policies can affect the health of related and supporting industries and promote cluster formation in many ways. Since each particular related or supporting industry has its own diamond, government policies concerning factor conditions, demand conditions, and firm strategy, structure and rivalry are clearly relevant. Of particular concern in this chapter, however, are government actions that help or hinder the clustering of competitive industries. Most important in this regard are regional and industrial policies.[15]

Regional economic development has always been a prominent and highly sensitive issue in Canada.[16] Related policy development and program implementation are further complicated by the division of powers between the federal and provincial governments. For instance, provincial government initiatives have been influenced by federal-provincial cost sharing arrangements.[17] Yet, in spite of significant expenditures at both the federal and provincial levels, the Economic Council of Canada notes that "gaps in [regional] opportunities have not only persisted, but in many cases widened."[18]

Rather than actively encouraging cluster formation and the "natural" growth of regional economies, regional development (and many industrial) policies in Canada have focused on fostering "sameness" throughout the nation. Such policies have often had the effect of promoting regional economic diversification unrelated to regional economic strengths.

The problem is not that diversification is undesirable, but that it must be related diversification. Each province then would have diverse but different economies. Historically, governments have addressed regional development in both indirect and direct ways.[19] Indirect policies have included the development of infrastructure, and policies focused on equalizing incomes and the availability of public services across regions. Direct policies have included grants, subsidies and loans to individual firms in specific locations.

This section reviews both direct and indirect federal and provincial government policies that affect clustering.

A. Indirect Federal Policies

i) Income Adjustment/Equalization

Canadians attach a high priority to providing income support and transfers to citizens living in less prosperous regions of the country. As early as 1939, the Report of the Royal Commission on Dominion-Provincial Relations recommended a policy of compensatory payments between the provinces to reduce disparities in regional per capita incomes. In 1957, the Gordon Commission called for the establishment of a national equalization payment scheme; shortly thereafter the first equalization payments to the Atlantic provinces began. Ottawa commenced a fiscal equalization program aimed at the reduction of regional disparities, the attainment of a national standard of public services and the equalization of provincial governments' revenues.

In 1982, the Constitution was amended to mandate that the federal government ensure that all Canadians receive reasonably comparable levels of "public services," such as education and health care. This reflected Canadians' strong historic attachment to the values of equity and sharing. Equalization payments are the primary means by which this obligation is fulfilled. All provinces except Ontario, Alberta and British Columbia now receive such payments, which totaled more than $8 billion in 1990. The provinces in Atlantic Canada receive the highest per capita payments, since they have the lowest average incomes. As a result of equalization transfers, less wealthy provinces have better social welfare systems and public services than would otherwise be the case. However, it has also been argued that Canada's system of transfer payments has made these provinces less economically viable. Support has artificially supported wages, resulting in higher unemployment and lower outward migration.[20]

ii) Support for Regional Infrastructure

Attempts have been made at both the federal and provincial levels to build advanced and specialized infrastructure. The establishment of the National Research Council in Ottawa has acted as a magnet to high technology industries and been successful in building a cluster of related and supporting firms in the Ottawa area. Other initiatives have been less successful when judged against the objective of building strong clusters. The development of bulk coal handling facilities at Tumbler Ridge, B.C., which was heavily subsidized by government, was opposed by the existing coal industry in British Columbia. Tumbler Ridge's great distance from the existing cluster of coal production centres in Southeast British Columbia contributed to the project's expensive failure. Similarly, some provincial governments, competing with each other to attract "high-tech" industries, have duplicated investments made in other provinces. An example is Quebec's proposed financial assistance for a biotechnology centre in Montreal, and the Ontario government's similar investment in Toronto.

Ever since the transcontinental railways were built over 100 years ago, the federal government has been heavily involved in providing basic infrastructure, including roads, railways, airports, pipelines, and the St. Lawrence Seaway. The establishment of agencies such as the Atlantic Development Board in the 1960s flowed directly from federal concern with regional infrastructure. Created to oversee infrastructure programs in the Maritimes, the board saw improved basic infrastructure as a way to broaden and diversify the regional economy. The Department of Regional Economic Expansion (DREE) also became an active participant in infrastructure development.[21] Most infrastructure investments have been successful in strengthening regional economies, although there have also been spectacular exceptions, such as Mirabel

International Airport in Montreal. As discussed in Chapter 6, it can also be argued that transportation subsidies such as the Crow's Nest Pass Agreement have actually discouraged the development of regional clusters of more sophisticated processing industries within the relevant local economies.

B. Direct Federal Policies

Over the years, a variety of federal and provincial agencies have been involved, through grants and subsidies to firms, in administering direct policies to promote industrial development. Historically, the principal goal of these policies has been to sustain or increase the employment base, often through unrelated diversification of regional economies. This runs counter to the goal of developing strong clusters, which typically requires the concentration of resources in specific locations to build on existing strengths and capabilities.

Few nations have been successful at building clusters through direct intervention. Significant regional disparities, as exist for example between the northern regions and the southeast regions of the U.K. or the industrial north and agrarian south in Italy, tempt governments into pursuing policies of subsidization and direct grants. Attempts to lure firms to locations which they would not otherwise be attracted to rarely produce sustainable competitive advantage or the development of true home base activities. For example, Italy's regional and industrial policies have focused not on factor creation but on rescues, subsidies and the promotion of development in the south. Such regional policies have not concentrated on building on existing clusters but rather have often consisted of attracting isolated plants to the south with heavy subsidies; these are widely perceived as failures.

Over the past 30 years regional development policies designated to alleviate regional disparities in Canada have been used repeatedly as a political tool by successive federal governments. The bureaucracies charged with overseeing these policies have changed shape several times. The focus has oscillated between relatively more centralized and decentralized approaches to program delivery. In 1987, the federal Department of Regional Industrial Expansion (DRIE), the successor to DREE, was disbanded and replaced by the Atlantic Canada Opportunities Agency and the Western Diversification Fund. The Department of Industry, Science and Technology Canada (ISTC) became responsible for regional industrial development in Quebec and Ontario. More recently, however, federal regional development programs for Quebec are being directed through the Federal Office of Regional Development, Quebec, which reports directly to the Minister responsible for Quebec. Overall, federal expenditures allocated to regional development amounted to approximately $1.2 billion in 1990-91.

Like other national governments, Ottawa's efforts to promote unrelated industries have achieved few successes. Unfortunately, there has been little appreciation of the potentially significant benefits to be gained from building on existing clusters of related and supporting industries. In addition, the focus of expenditures -- originally directed at Atlantic Canada -- now covers most regions and sectors of the economy. This has diluted central government attempts to reduce regional disparities.

i) Creating Jobs, Not Clusters

Sustaining high levels of employment -- rather than reinforcing clusters -- has been a common, usually explicit, theme of government policies. The Area Development Agency, for example, set up in Atlantic Canada in 1963, was an early federal regional industrial development initiative.[22] The agency was not notably successful in attracting manufacturing industries to relocate to Atlantic Canada. Target locations were designated based on the existence of high levels of local unemployment. Larger population centres or existing industrial centres were often ineligible or passed over. The nature and extent of local industrial strength was not a major consideration.

Even when successful industries were attracted to the region, such as Michelin's tire plants in Bridgewater and Granton, Nova Scotia, such investment "successes" were achieved at a high cost. Michelin chose Nova Scotia over Quebec because of Nova Scotia's non-unionized, low-wage labour, and in fact represented half of Nova Scotia's manufacturing growth between 1971 and 1975. However, Michelin only accepted a further $56 million in assistance to establish a new tire production facility in 1981 on the basis that legislation would be introduced to prevent the United Rubber Workers from organizing at its existing Granton facility.[23] Spill-over effects into the local economy, apart from employment, were relatively limited. Michelin imported virtually all capital equipment duty-free, and construction and design crews were brought in from France.

ii) Bypassing Existing Clusters

A common tendency in Canadian regional development policy has been the failure to capture the potential benefits of reinforcing existing clusters. The presence of an established cluster signals the presence of some favourable determinants of competitive advantage and increases the likelihood that government involvement will be successful. In Canada, the tendency has been to provide employment not where nascent or established clusters were present but in specifically targeted areas. As the Economic Council of Canada has noted, this has repercussions for both the regional and national economy. "Federal or provincial policies designed to promote industrialization in regions where it does not normally occur will sometimes have negative repercussions on national output."[24] In the early 1970s, Volkswagen proposed to invest in a parts plant in Barrie, Ontario, to take advantage of the federal duty remission program. DREE pressured Volkswagen to locate the facility in Montreal or Halifax, even though neither location was desirable in relation to the automotive parts cluster located in southern Ontario.

A recent example of how federal policies have failed to leverage existing cluster strength was the designation of Montreal and Vancouver -- but not Toronto, Canada's leading financial centre -- as international financial centres. Other, more dramatic examples of failed diversification attempts are the experiment to build the Bricklin automobile in New Brunswick, and the construction of two expensive heavy water plants in Nova Scotia's Cape Breton Island (far removed from potential customers). Nova Scotia's foray into heavy water production at Glace Bay in partnership with Deuterium of Canada Ltd. (DCL) cost tax payers dearly. Following the award of a heavy water contract from Atomic Energy of Canada Limited (AECL), Industrial Estates Limited, a Crown Corporation, took a majority share in DCL. Before heavy water was actually produced twelve years later in 1976 (by which time AECL had taken over control of DCL, Nova Scotia had written off $135 million.

A further example of a potentially "artificial" diversification investment engineered by government is the proposed location of the Squalus jet trainer manufacturing facility in Saskatoon, thousands of kilometres from the Ontario and Quebec aircraft assembly cluster. The Saskatchewan government is reported to have pledged $20 million in order to secure this facility, although the federal government declined to provide a loan for a further $20 million to induce the proposed Belgian-Canadian joint venture to locate in the Prairies, rather than in Ontario or at the other alternative site (a vacant military base in PEI). Similarly, although the National Aeronautical Establishment of the NRC and the Canadian Aeronautics and Space Institute are located in Ottawa, the federal government chose to put the Canadian Space Agency in Montreal. The agency is not mandated to build on existing clusters. Instead, it is expected to ensure that "contracts are distributed fairly throughout the country under the government's regional distribution objectives for space-related activities."[25]

iii) Regional Development in Atlantic Canada

The history of development efforts in Cape Breton illustrates issues associated with the stimulation of indigenous clusters of related industries. The Cape Breton Development Corporation (DEVCO) was established in 1967 to oversee and compensate for the down-sizing of the area's uncompetitive coal and steel sectors.[26] However, the oil shock of 1973 and the consequent rise in the price of imported oil led to a reversal of the down-sizing decision, and DEVCO instead used $55 million of federal funding to promote the construction of coal mines intended to supply a new coal fired power station at Lingan, Nova Scotia. Much of its investment activity was unrelated to existing regional strengths or capabilities.[27]

By 1985, the Cape Breton Advisory Committee, which had been appointed by the federal government to review local regional policies, voiced strong criticism of the results of the past three decades of development initiatives. In response, the federal government established Enterprise Cape Breton (ECB) in 1985 to promote regional economic development through industrial assistance and related programs and services. ECB became part of the Atlantic Canada Opportunities Agency in 1987 and, in the following year, it took over the industrial development division of DEVCO. During the five-year period ending in 1990, the agency disbursed over $260 million. A recent review of ECB's activities concluded that "money alone does not address the root causes of economic decline" and that the agency had been unsuccessful in "addressing and solving Cape Breton's structural problems."[28] Interestingly, the study found that locally-owned projects had a much higher success rate than projects directed, or controlled, by companies from outside Atlantic Canada. Similarly, smaller projects were usually more successful than larger ones.

iv) Blurred Objectives

The federal Industrial and Regional Development Program (IRDP) was the former Department of Regional Industrial Expansion's principal funding program for business, providing over $1.2 billion in support between 1983 and 1988. IRDP's stated objective was to "assist eligible businesses to increase competitiveness and sustain growth in order to contribute to economic prosperity in all regions and reduce economic disparity across Canada." A recent evaluation of the program concluded that the redistribution of funds through IRDP to disadvantaged regions had had "limited impact in terms of producing significant regional economic benefits."[29] A similar bias evident in the case of ECB expenditures -- that large firms tended to receive a much bigger share of assistance than small firms -- was noted. In addition, there was inconsistency between the sectoral and regional development emphasis of the program. Multiple selection criteria for projects, and a shifting emphasis between the goals of regional development, job creation and the promotion of strategic technologies diverted attention away from assessing the requirements of existing firms in the regional economies.

v) Promising Recent Developments

There is some recent evidence that governments are gaining a better appreciation of how policies and programs can strengthen clusters and encourage market-driven regional economic activity. The federal Department of Industry, Science and Technology Canada (ISTC) has evaluated a recent program aimed at improving the development of supplier industries. Through a series of seminars, ISTC sought to raise the level of awareness among small and medium-sized suppliers concerning the needs of large international corporations. Introduced in the fall of 1990 with a seminar in Toronto (in conjunction with Centennial College of Applied Arts and Technology and multinational buyers including Unisys, Motorola, IBM Canada, AT&T Canada and Northern Telecom), the program offers coordinated assistance to help supplier firms upgrade their supply capability to meet international firms' high sourcing standards. A collaborative program may be launched by governments and industry to improve the ability of Canadian suppliers to attain or sustain qualified supplier status to multinational businesses located in Canada. This type of focused program can help Canadian companies become suppliers to major firms -- often multinationals -- that have operations in their regions. It has the potential to strengthen elements of many industry diamonds, and is especially timely given the increasingly demanding international procurement standards being set by multinational firms based in Canada. Strengthening existing clusters of supplier industries can help persuade some market-access foreign investors to keep or establish certain home base activities in Canada.

The Technology Outreach Program (TOP), a cornerstone of ISTC's mandate to improve the productivity and competitiveness of Canadian industry, provides start-up and sustaining support to centres that promote the sharing and acquisition of new industry knowledge. TOP, however, does not directly encourage cluster formation. Enhanced information flow between businesses in the same industry is, of itself, insufficient to form competitive clusters. Rather, multiple businesses in related industries need encouragement to form close networks for cooperation and information exchange.

In addition, the Strategic Technologies Program (STP) is an example of clear, targeted promotion of industry clusters. However, it does represent an attempt to pick future winners by funding biotechnology, information technology and advanced industrial materials. These clusters are not currently well-developed in Canada and will remain so unless linkages can be sustained between all elements of the relevant industry diamond.

C. Provincial Policies

Each province has policies that affect both the environment in which business operates and the fortunes of specific industries, and sometimes of individual firms. These policies can be divided into two groups: those that shape the operating environment for business in the province, and those that impact specific business situations, such as rescues of insolvent firms or targeted development support for industry clusters or stand-alone enterprises. The latter are the focus of this section.

Beginning in the late 1960s, most of the provinces instituted industrial assistance programs, usually coordinated through a provincial development corporation or agency. The basic objective of these programs was to spur development of the provincial economy -- especially the more depressed areas -- and to encourage cooperation on interprovincial industrial policy initiatives. In addition, the provincial agencies that were created to coordinate industrial development were charged with overseeing the distribution of assistance throughout the province. Provincial governments had their own "regional" development goals. As provinces have moved aggressively into the field of industrial and regional policy, provincial transfers to business have grown remarkably. In 1971, total provincial transfers to business were less than one half of total federal transfers to business; yet, by 1990, total provincial transfers to business exceeded federal transfers to business by nine percent.[30]

I) Influences on Cluster Development

Regional development initiatives pursued by the provinces provide examples of both positive and negative impacts on cluster development. Competition among provinces to be the chosen location for federal development or procurement initiatives has often resulted in projects being located in areas distant from any cluster of related industries. Again, short-term job creation has usually been a higher priority than the fostering of viable industries and industry clusters.

Interprovincial competition over the location of Bell Helicopter is a typical example, though in this case the outcome was constructive for the existing cluster. In the early 1980s, the federal government launched studies that led to the establishment of a state-of-the-art Bell Helicopter manufacturing facility in Mirabel, Quebec (the provincial government also provided financial assistance). Although other provinces lobbied for the facility, the Quebec location turned out to be more logical because it is close to the already established aerospace cluster. The company benefits from nearby suppliers and related aerospace companies, while other companies in the cluster have developed specific expertise related to supplying the needs of the helicopter industry.

The Alberta government has been active in regional industrial policy. For several years, it has used its $12 billion Heritage Fund and other industrial expansion programs in an explicit effort to diversify its economy and reduce dependence on the oil and gas industries. A full panoply of grants, loan guarantees, direct government investments in firms, and R&D incentives has been employed. Attempts at diversification, however, have had mixed results at best, and illustrate both the successes possible when industry clusters are formed and the failures that often follow when cluster development is disregarded.

In a bid to reduce the amount of unprocessed natural gas being exported from the province, Alberta sought to establish facilities that would separate ethane from the gas and form ethylene, a basic petrochemical. The provincial government negotiated an agreement with Dow Chemical under which Dow agreed to build an extraction plant and provide purchase guarantees (price and quantity) for 20 years. It was felt that this would lead to the establishment of a natural gas-based petrochemical industry in Alberta. The result has been positive -- the creation of a successful industry that is intimately related to existing strengths in the extraction industry. Other industries related to the petroleum extraction and refining industries have also emerged to bolster this sector of the Alberta economy. One indication of the success of this initiative is that Dow is now building a third ethylene plant. The industry has matured sufficiently to allow further capacity developments in the province to be driven by market forces rather than government.

The ethane success story in Alberta is counter-balanced by the difficulties that the provincial government has experienced with its interventions and investments in industries such as meat processing, magnesium smelting, and cellular communications. The government-financed venture into cellular communication was through Novatel. Its bid to become a competitor in the cellular telephone equipment market has met with little success, as indicated by its recent losses. The Alberta government's decision to take over meat-packing company Gainers when it defaulted on loans (coupled with its continued subsidization of the company's operations) has distorted market conditions in the industry and prompted down-sizing and layoffs at competing firms. This undermined the objectives of the takeover, which was primarily to maintain existing employment levels and sustain the existing Alberta cluster. However, as is common, direct government involvement has proved extremely disruptive to the industry.

Quebec's industrial and regional policies have often been focused on nurturing and developing clusters. It has leveraged cheap hydroelectric power to attract energy intensive industries such as aluminum and magnesium smelters. Also, in a combination of French and Japanese-style corporatism, Quebec has challenged the boundaries of Canadian financial regulation by linking industry, finance and provincial government policy in a powerful way. The Quebec Stock Savings Plan encourages Quebecers to invest in provincial businesses. The Mouvement Desjardins des Caisses Populaires is the largest deposit taking institution in Quebec, and focuses its $44 billion of assets on developing Quebec's economy. Similarly, the National Bank has a distinct Quebec base and investment focus, while the unique provincial pension fund uses its assets to promote Quebec business and lend to the provincial government. In addition, the Solidarity Fund of Quebec Labour has increased its investment funds by an estimated $100 million over the past year, primarily to be invested in Quebec-based companies and activities. The result is a high degree of cooperation between government and capital pool managers to encourage development and expansion of the Quebec economy -- in effect, encouraging the development of the region by investing in companies that are already successful and by allowing them to expand their operations around successful clusters.

Not all of Quebec's "guiding-hand" investments have flourished, however. In part, Lavalin's recent troubles stemmed from its purchase, at provincial behest to save jobs, of the Gulf-Ultramar petrochemical refinery in Montreal through an investment in Kemtec Petrochemical Corporation. Equally unsuccessful was Lavalin's vertical integration into Urban Transit Development Corporation (UTDC) at the encouragement of the Ontario government. Lavalin's recent financial difficulties and attempts to divest these businesses are indicative of the company's inability to integrate into manufacturing. Instead, the company, recently acquired by SNC, will be rebuilt around its core strength -- engineering and project management.

The regional development of Ontario, particularly its southern portion, has been largely driven by transportation routes and the presence of market access-driven industry taking advantage of proximity to the U.S. and a significant Canadian population concentration. Specific government initiatives have included the Ontario Development Corporation, which was formed in 1966. The corporation and its related organizations are the prime vehicles through which government financial assistance is directed to private sector business in Ontario. It has a mandate to encourage the development and diversification of industry and tourism in Ontario through the use of term, mortgage, and working capital loans, bank loan guarantees, and in some cases equity investments. An intra-provincial regional development focus was introduced in the early 1970s with the creation of the Northern Ontario Development Corporation (1970) and the Eastern Ontario Development Corporation (1973). With the establishment of these bodies, the Ontario Development Corporation's activities became focused solely on southern and central Ontario. A business sector approach was added in 1987 through the creation of Innovation Ontario, mandated to provide equity investments and loan financing to early-stage, high technology venture capital businesses and to supply loan guarantees for small business start-ups.[31]

All of the Ontario programs and agencies place a specific emphasis on increasing employment, improving growth in less prosperous regions, increasing exports, and diversifying and expanding the economic base of individual regions. The primary financing methods are loan instruments, although the Innovation Ontario Corporation offers support through both equity investment and working capital loans that require a definite royalty-payout to the corporation. The Ontario development corporations also work in conjunction with development projects initiated by Ontario government ministries other than their parent ministry, Industry, Trade and Technology. The Northern Ontario Development Corporation, for example, administers the NOR-DEV program for Northern Development and Mines, as well as other programs for the Ministries of Mines, Energy, Citizenship, and Tourism and Recreation. Export financing of up to 90 percent of an individual shipment up to $1 million is available, and development and redevelopment loans are available for tourism-oriented facilities. The bulk of the loans and guarantees are channeled to the northern region, mainly to non-cluster related manufacturing businesses, with a total provision of $110 million in fiscal 1989-90. The Southern Ontario Development Corporation gave $94 million in the same year, mostly in the form of new venture, manufacturing, and export related loans and guarantees. Overall, the Ontario development corporations wrote off approximately ten percent of their investment in 1989-90.

The painful lessons learned from previous efforts to promote ventures at too early a stage (as was done by the former IDEA Corporation), and from previous government involvement in very high-profile, large-scale ventures (for example, the Minaki Lodge), have been incorporated into the new ODC structure and guidelines. Evidence exists that the corporations are beginning to focus on companies that support industries which are already competitive -- for example, secondary manufacturing and service firms that support the mining industry in northern Ontario.[32] This approach is consistent with the goal of using government industrial development programs to foster stronger clusters.

Examples of initiatives pursued by other provincial governments underscore the frequent failure to build on existing regional strengths. The Newfoundland government attempted to subsidize the Come-by-Chance refinery in the 1970s, but the venture failed after three years of operation, with debts in the range of $700 million. Further taxpayer losses arose from a $40 million federal government investment in wharf infrastructure for the refinery.

In the 1960s, Nova Scotia established a Crown Corporation, Industrial Estates Limited, to attract secondary manufacturing jobs to the province. One unrelated industry encouraged to relocate from Ontario was the audio equipment manufacturer Claritone Sound Corporation. By the time of its foreclosure sale in 1972, this venture had cost Nova Scotia taxpayers $26 million.

The Manitoba government saw little return on its investment in Churchill Forest Industries or the Flyer bus company. In the case of Churchill Forest Industries, the Manitoba Development Corporation lent a total of $100 million to a fraudulent syndicate to start operations in a chronically depressed region. The desire to maintain jobs has kept the operation (now known as Manitoba Forest Resources Limited, or Manfor) afloat, despite large losses. In 1989 the government finally sold the operation to Repap Industries, for $132 million. However, provincial tax revenues are still at risk since the deal included substantial government loan guarantees as well as promises of infrastructure development. Manitoba's ownership of the Flyer bus company between 1979 and 1986 did not improve the company's circumstances. In fact, the company lost over $75 million during this period. However, the firm was purchased by Den Ousten Bus Works, a Dutch company specializing in urban bus construction. The resulting infusion of management, operational and technological change has returned Flyer to profitability.[33]

ii) Federal-Provincial Tensions

The uneasy balance of power between the federal and provincial governments, and between the provincial governments themselves, has added to the difficulties inherent in regional and industrial development. Ottawa's fiscal capacity has led to direct involvement (through shared cost agreements, direct payments, and specialized infrastructure investments) and indirect involvement (through equalization payments and income transfers) in the economic health of the provinces.

The ten-nation study highlighted the influence of local government policy because of the powerful role of geographic concentration in national advantage. In Germany, for example, local government is actively involved in supporting education (particularly related to science and technology) and other projects closely tied to concentrations of local firms. In Italy, local governments are much more constructive than national government, taking intense interest in their successful industries and building up local factors such as universities, credit institutions and specialist infrastructure.

Accordingly, central government efforts can often be more productive if they support many local efforts rather than a few centrally chosen ones. The Economic Council of Canada has commended the federal government's Community Futures program (introduced in 1986 as part of the Canadian Jobs Strategy) for its focus on supporting locally driven initiatives. Investments made by local development organizations in human resource development and local information infrastructure are likely to pay far greater dividends than direct commercial activity sponsored by governments.[34]

4. SUMMARY

Strong home-based related and supporting industries are often an important source of competitive advantage for firms. Our detailed industry studies, however, found a general lack of strong clusters in Canada -- a pattern originally suggested by the export analysis in Chapter 2. Related and supporting industries were found to have played a positive role in enhancing competitiveness in less than one-quarter of the industries studied.

In some of Canada's most competitive sectors such as forest products, metals and minerals, and transportation, supporting inputs -- notably machinery and equipment -- are often sourced from abroad. In addition, many of the supporting industries in Canada are populated by foreign controlled firms with home bases outside of Canada. Of the manufacturing industries we studied that have derived competitive advantage from supporting industries, many have done so through backward integration into critical supply components.

The lack of world-class machinery and equipment industries means that Canada is often not on the cutting edge of the process technologies that are critical to present and future competitive advantage in its core industries. In addition, competitive machinery industries offer a repository of skills and expertise that can be used across the entire manufacturing sector. This is emphatically not to say that such industries should be protected or subsidized. Cutting Canadian firms off from foreign suppliers of leading-edge technology and machinery would be counterproductive. The point is, rather, that the failure of world-class machinery firms to develop in Canada signals that Canadian firms are not leaders in many of the technologies that are important to productivity growth in Canadian industry, and that Canada's economy lacks a source of advantage possessed by many of its major competitors.

In Canada's resource sectors, relatively few examples were found of leading-edge technology and research in Canadian-located supporting industries. There are some exceptions which illustrate the advantages that can flow to resource producers from working closely with Canadian-based operators in supporting machinery and equipment industries. In the transportation sector, few truly competitive supply industries to automotive assembly were found. This is worrisome given the size and significance of transportation industries to the Ontario manufacturing heartland. In general, there is a notable dearth of competitive machinery and equipment suppliers across all major sectors of the Canadian economy.

The result of generally weak linkages between industry diamonds has been a lack of interconnected, competitive, Canadian-based industries, coupled with too little depth in the clusters of competitive industries themselves.

The ability of governments in Canada to assist in fostering the process of clustering has been hampered by the persistent politicization of the policies needed to build clusters, suppliers and competitors in specific regions. Many of the policies long favoured by both the federal and provincial governments have been aimed at encouraging uniformity in regional economic bases, promoting unrelated diversification of industry, and sustaining unrealistic levels of employment in isolated areas.[35]

Federal and provincial economic "diversification" initiatives have frequently sought to develop industries on a large scale, through industries unrelated to the special skills and existing competitive businesses of the target regions. We did find some examples that illustrated the potential of regional development to lever existing skills and competitive strengths. With the failure of so many regional development initiatives, governments in Canada have become more sensitized to these issues. To succeed in spurring regional and industrial development, governments must be willing to focus their policies and programs to create an environment in which successful industries network and operate to reinforce upgrading of competitive advantage.

CHAPTER 9

FIRM STRATEGY, STRUCTURE AND RIVALRY IN CANADA

This chapter examines the fourth broad determinant of national competitive advantage in industries -- the context for firm strategy, structure and rivalry. The national environment creates a context which influences a firm's choice of strategies and the way companies are organized and managed. It also shapes the goals of individuals and firms, influencing investment and productivity. Finally, the nature of domestic rivalry has a profound influence on the process of innovation and upgrading of a nation's industries.

The first section of this chapter explores the context in which firm strategies and organizational structures have been developed in Canada. The second section analyzes the goals, motivations and incentives of individuals and firms in Canada. The third section examines aspects of firm rivalry in Canada, including patterns of industry concentration, trends in firm profitability and the extent of new business formation. The final section of the chapter discusses government's impact on individual and firm goals as well as on the character of firm rivalry and behaviour.

1. THE CONTEXT FOR STRATEGY AND ORGANIZATION

A number of forces have influenced the strategies adopted by firms in Canada. Factor abundance has nurtured and reinforced an inclination to rely on static, cost-based strategies in many sectors. A tradition of heavy government involvement in commercial activity through Crown Corporations (and regulation) has affected market structure and company goals in some sectors. The strategies adopted by most Canadian industries have also been marked by a strong inward-looking focus on the domestic market. This pattern can be explained by factors such as historically high tariffs and the relative attractiveness of the Canadian market.

A. Static Cost-Based Strategies

The competitive advantage of many of Canada's resource industries depends on access to low-cost basic factors. An abundance of low-cost inputs has meant that firms in these industries have historically sustained adequate profit levels over the business cycle, reducing financial pressures on them to invest in the latest process technologies. Our industry studies suggest that a pronounced focus on static cost advantages, such as resource cost or scale, has influenced the extent of firms' adoption of process technology and manufacturing equipment.

Many firms in industries with factor-driven advantages continue to operate labour-intensive processes that are less productive than those of the average foreign rival. Marketing executives at major Canadian equipment suppliers stated that, in resource industries such as mining and pulp and paper, an often static view of cost has led companies to make equipment purchase decisions primarily on the basis of price, sometimes to the exclusion of other factors such as technical superiority and performance capability. Slow upgrading of process and/or product technologies has been common among firms in industries such as newsprint, Atlantic fish, beef processing and market pulp. In many of these industries, however, the competitive advantages associated with basic factor advantages are eroding, meaning that Canadian firms increasingly must look to other sources of competitive advantage. This does not necessarily mean a shift away from competing on cost, but it does suggest a need for more sophisticated cost advantages based on technology, skills and rapid improvement.

At the same time, however, our research discovered a number of Canadian industries that have pursued differentiation strategies and competed on the basis of advanced skills and expertise. In the ice skate industry, for example, competition has revolved around leading-edge technology and building strong brand names. Similarly, technology-focused competitive strategies are found in flight simulators, central office switches and urban rail.

Often this focus on advanced skills and expertise is supported by other elements of the diamond. Consulting engineering firms have served very demanding and sophisticated buyers in the segments in which they participate, such as power generation and distribution, petroleum and natural gas refining, forestry and forest products, and mining. Examples include the trans-Canada pipeline construction, which resulted in the development of expertise in extremely harsh terrain and climates, and the James Bay project, which fostered the development of world-class, large-scale project management skills.

These examples illustrate that more favourable Canadian diamonds translate into more sophisticated modes of competing. Fostering environments more conducive to innovation and productivity growth is a central theme that permeates this study.

B. Impact of Government Ownership

Direct ownership by both federal and provincial governments of enterprises active in competitive markets has long been a feature of the Canadian economy. There are hundreds of government-owned enterprises in Canada today, although many do not operate in competitive markets. Currently, the federal government has 53 parent Crown Corporations, which in turn have 110 wholly-owned subsidiaries.[1] Many more Crown Corporations exist at the provincial level. Governments have made active use of Crown Corporations to further a wide array of public policy goals, including job creation, regional development, infrastructure development, and the provision of services not supplied by the private sector. With goals that do not make commercial success the dominant priority, innovation and productivity growth often suffer.

Historically, some federal corporations -- for example, Air Canada, Fishery Products International, and Petro Canada -- have participated in competitive markets on the basis of strategies intended to achieve goals other than profit maximization. This has reduced pressures for innovation and productivity growth. One publicly-owned firm --

Air Canada -- did not even have "profitability" as a specified objective until 1978. Pursuit of non-commercial objectives led to a striking level of inefficiency in its operations: one-sixth of all employees were in management; it had reservation offices in eight different cities and a finance department in Winnipeg, all processing documents for the head office in Montreal.[2] Air Canada's non-competitive orientation had an impact on the market for air services in Canada, and on the strategies and level of efficiency of other related firms in the industry.

Today, there is a desirable trend toward less widespread government ownership in Canada than in the past. Close to 20 federal Crown Corporations have been privatized in recent years, including Air Canada and Fishery Products International. Since privatization, Air Canada has implemented significant cost reductions. Some provincial governments have also privatized or wound down Crown Corporations previously active in commercial sectors, although more could be done at this level to further enhance competitive market forces. Overall, Canada had more state ownership at the federal level in 1991 than the U.S., but less than other advanced European and Asian nations (see Figure 9.1).

Figure 9.1

EXTENT OF PUBLIC OWNERSHIP BY SECTOR, SELECTED COUNTRIES, 1991

	Posts	Telecom-munications	Electricity	Gas	Coal	Railways	Airlines	Steel
Canada	●	◑	◕	○	○	◑	◔	○
U.K.	●	◑	○	○	●	●	○	○
U.S.	●	○	◔	○	○	◔	○	○
Italy	●	●	◕	●	○	●	●	◕
Japan	●	●	○	○	○	◕	◔	○
South Korea	●	●	◕	○	◔	●	○	◕
Sweden	●	●	◑	●	N/A	●	◑	◕
Switzerland	●	●	●	●	N/A	●	◔	○
Germany	●	●	◕	◑	◑	●	●	○

SOURCE: MONITOR COMPANY ANALYSIS UPDATED FROM J.R.S. PRITCHARD, *CROWN CORPORATIONS IN CANADA*

Privately-Owned: ○ All or nearly all

State -Owned: ◔ 0-25% ◑ 25-50% ◕ 50-75% ● All or nearly all

C. Inwardly Focused Strategies

The strategies followed by the vast majority of firms operating in Canada have been focused on the domestic market, as demonstrated in the cluster charts presented in Chapter 2. Though exceptions certainly exist, a plethora of recent studies have pointed to the absence of a broad international orientation on the part of Canadian business. Canada's prestigious Corporate-Higher Education Forum has lamented the poor international business skills of Canadian managers and called for a stronger international orientation in management education programs.[3] The 1990 IMD/World Economic Forum Survey of Business Executives ranked Canada 15th out of 23 countries in its International Orientation category. A 1989 Ernst and Young study estimated that 72 percent of Canadian manufacturers do not serve export markets, including the United States.[4]

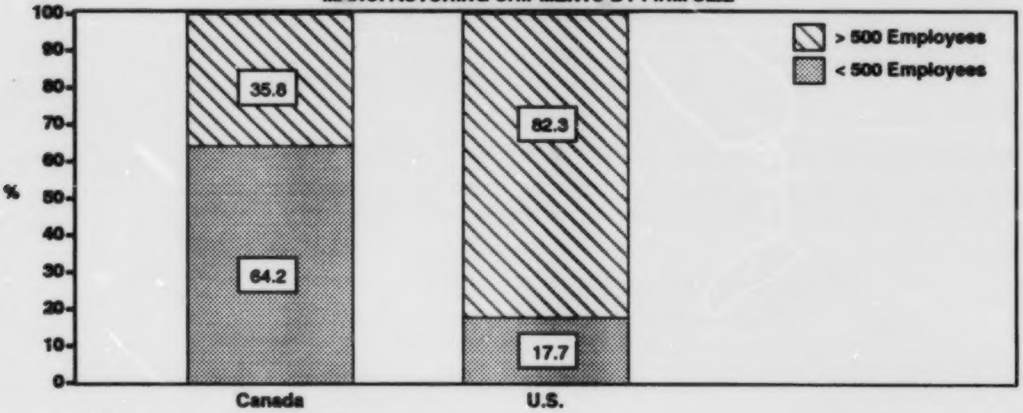
This general perception of Canadian industry's insular orientation was reinforced by the views of executive search consultants. According to a senior partner in a prominent research firm, "few Canadian executives have the skills and world-wide experience to launch products in an international market . . . we've been insular for a number of years . . . as a training ground for the true international executive, Canada still has a long way to go."[5] Our industry studies echoed this view. One senior executive in the Canadian distilled spirits industry attributed the failure of whisky products to penetrate non-North American markets to the "weak international outlook of Canadian firms."[6] An executive in the cobalt radiation therapy equipment industry pointed to a Canadian inferiority complex in selling products overseas. "Canadian firms," he stated, "are not aggressive enough in seeking international markets."[7]

Foreign-Controlled Firms: In the manufacturing sector the insularity of Canadian firms extended to foreign-controlled firms which were often established in Canada simply to gain access to the local market. Rather than develop the necessary scale to export, these "branch plants" traditionally concentrated on supplying the Canadian market. In many industries, this domestic focus continues to this day. As discussed in Chapter 3, the majority of foreign-owned firms do not operate with Canadian home bases in product lines or business segments. Often, the mandates for Canadian divisions of foreign-owned firms do not extend to serving markets outside the country.

Small and Medium-Sized Businesses Predominate: Like Italy and Taiwan, Canada is well populated by small and medium-sized businesses which, collectively, account for a substantial portion of total economic activity. Almost 99 percent of all businesses in Canada are categorized as "small" -- having less than 100 employees.[8] The contribution of small and medium-sized enterprises to total manufacturing output is far greater in Canada than in the U.S., for example (see Figure 9.2).

Figure 9.2

CANADA - U.S. COMPARISON OF TOTAL MANUFACTURING SHIPMENTS BY FIRM SIZE



NOTE: U.S. data 1982; Canada 1986
SOURCE: U.S. NATIONAL SCIENCE FOUNDATION; STATISTICS CANADA MANUFACTURING OUTPUT DIVISION

Typically, these firms have had a strong domestic focus and eschewed active participation in export markets. According to one estimate, companies with annual sales below $10 million account for less than six percent of direct Canadian exports of manufactured goods -- although many of these companies do export "indirectly" by supplying components and services to larger firms. The same study found that only three percent of manufacturing firms with sales below $5 million in 1986 were involved in exporting, with their foreign sales accounting for just one percent of all Canadian manufactured exports in that year.[9] In short, limited international expertise, coupled with restricted access to capital, has led the vast majority of small and medium-sized firms -- including manufacturers -- to concentrate on serving the Canadian market.

Italy's experience is quite different from Canada's. Most of Italy's internationally successful industries are comprised of dozens of small and medium-sized firms that typically compete with focused strategies. Many of these small Italian firms export 95 percent or more of their output. Often the firm's owner spends a significant amount of time abroad seeking customers. Italian industry associations have evolved to meet the international business needs of these firms. These industry associations sponsor basic research, provide information and promotions on foreign markets, arrange for joint warehousing, engage in bulk procurement and even provide administrative services for member firms. Third-party firms have grown up to provide transportation and logistics for small and medium-sized Italian firms. Trading companies have developed to market products abroad. An entire commercial infrastructure has developed that allows small Italian firms to successfully penetrate world markets.

In contrast, Canada's hundreds of fragmented industry associations generally have not provided a broad array of support activities to their member firms, and have not had a mandate to help small and mid-sized firms participate in international markets. One recent survey, for example, found that only seven percent of industry associations had export promotion as an explicit objective.[10]

Resource Industries are Partial Exceptions: Most firms operating in the resource sectors of Canada's economy -- whether foreign- or Canadian-controlled -- represent an exception to the pattern referred to above. As we have seen, Canada's export position in resource-dominated clusters, while well developed, is heavily dependent on shipments to the U.S. market. Canadian upstream activities are highly export-driven, and in these sectors Canada has achieved significant international success. As price takers on world markets, Canadian resource companies that export successfully almost by definition must be internationally competitive.

However, even in the resource industries, downstream products are often manufactured predominantly for the domestic market. For example, while Canadian firms are highly successful at exporting market grade pulp (23 percent world export share), their international presence in fine paper is almost non-existent (less than one percent world export share). The fine paper that is produced ($1.3 billion of shipments in 1989) is primarily consumed in Canada, not exported.[11]

Of course, many individual Canadian firms have successfully tackled export markets with higher-value products and services, some of which were examined in our industry studies. Firms such as Alcan, CAE, Inco, and Laidlaw have developed an impressive presence in export markets. Canadian information technology companies such as DMR and Systemhouse have also succeeded in the global marketplace for information consulting services and system integration services. These examples illustrate that despite impediments to upgrading present in many industry diamonds, Canadian firms that have consistently focused on satisfying the needs of demanding international customers -- often beyond the U.S. market -- can strengthen their competitive advantages.

2. GOALS

Marked differences exist between nations in terms of goals and motivations of employees, managers and firms. Goals are influenced by the attitudes and incentive structures that are present in a nation. These, in turn, influence the strategies that firms undertake. Firm goals are also strongly influenced by the nature of a nation's corporate ownership and governance, a function of history, regulation, tax policies, and other national circumstances.

Nations will typically succeed in industries where goals support sustained investment, the upgrading of skills and unusual commitment and effort. In addition, national advantage is enhanced by labour/management relations that encourage investments to upgrade skills and to exchange ideas across functions.

A. Goals of Individuals

The motivations of individuals who manage and work in firms can enhance or detract from success in particular industries. The critical issue is whether individuals are encouraged to improve their skills and to expend the effort required to create competitive advantage.

Economic and cultural circumstances within a nation shape the goals of individuals. In the U.S., for example, the desire to achieve personal wealth acts as a distinct stimulus to hard work and educational achievement. In other nations, such as Sweden, with its traditionally high marginal tax rates, this particular goal is less important. In Japan, a strong desire to attend the best schools and work for the best-known companies reinforces the emphasis on education. It must also be noted that the U.S. environment may engender goals less supportive of skill-building and hard work than nations such as Japan and Germany. While no particular set of values is right or wrong, of course, differences in prevailing value systems clearly can affect a nation's competitiveness.

It is hard to identify a particular set of individual goals as peculiarly Canadian. However, comparing Canada to the U.S. is notable for several reasons. Because the Canadian and American economies are so closely intertwined and citizens of the two countries have much in common, some insight into individual goals in Canada can be gleaned by drawing comparisons with the United States. There is considerable evidence to suggest that, at least compared to their American counterparts, Canadians tend to be less-driven by the goal of acquiring wealth, and more concerned with economic security.[12]

I) Less Performance-Based Compensation

The nature of incentive structures offered to managers and employees influences their commitment to upgrade skills and to expend unusual effort. One important issue is the link between compensation and performance. Recent comparative studies indicate that Canadian managers and employees are not provided the same level of incentive-based compensation as their American counterparts, who receive a higher portion of their total compensation in variable pay. In 1989, bonuses accounted for 35-40 percent of the typical U.S. manager's pay, but for only 20 percent of the average Canadian manager's pay.[13] Interviews with compensation consultants revealed that Canadian firms use fewer performance-related compensation programs than American firms. They also employ programs that are shorter-term in nature. One recent survey found that only 48 percent of Canadian companies had bonus plans that related executive pay to long-term company performance, in contrast to 92 percent of firms in the United States.[14]

II) Higher Marginal Tax Rates

The tax system has a substantial bearing on the willingness of individuals to take risks, upgrade skills and expend effort. Canada's top marginal income tax rates are substantially higher than in the United States. While marginal rates are lower than those in some industrialized nations, as discussed more fully in the government policy section later in this chapter, the total tax burden facing individual Canadians is high compared to the U.S. -- the most relevant reference point for Canadians.

Governments in Canada rely heavily on personal income taxes to raise revenue. In 1988, almost 37 percent of all government tax revenues were derived from taxes imposed on personal incomes, compared to an average of 31 percent for all OECD countries. Taxes on personal incomes amounted to 12.5 percent of Canadian GDP in 1988, compared to 10.3 percent in the U.S., 9.9 percent in the U.K. and 7.2 percent in Japan.[15]

Combining federal, provincial/state, and individual income surtaxes, the highest all-in marginal tax rates are approximately 50 percent in both Quebec and Ontario. This compares with top rates of 37 percent and 36 percent in California and New York, respectively.[16] Taking into account differences in the tax treatment of mortgage interest as well as other differences in tax regulations between the two countries, it is clear that upper income Canadians and well-paid professionals and entrepreneurs in this country face a much higher tax burden than similar individuals in the United States. Differences in the tax burden between the two countries are smaller, however, in the case of lower income individuals and families. Overall, the 1990 IMD/World Economic Forum Survey of Business Executives ranked Canada 17th out of 23 nations on the criterion of the extent to which trends in taxation and social security encouraged the will to work.[17]

iii) A History of Advancement Based on Merit

The knowledge that promotion is merit-based encourages skill enhancement and unusual effort and Canada has a strong record of such advancement. Our industry studies indicated that many CEOs had progressed through the ranks of their companies to assume their present responsibilities. David Race of CAE Industries, Kenneth Harrigan of Ford Canada, Jack McLeod of Shell Canada and Raymond Smith of MacMillan Bloedel, for example, all have worked at least 25 years for their respective firms. Prospects for merit-based hiring, promotion and advancement within Canadian organizations are also enhanced by a network of provincial Human Rights Commissions.

In contrast, organized labour in Canada has historically tended to resist promotion based solely or largely on skills and merit. Recently, however, some progress has been made in moving away from strict seniority-based advancement. The percentage of unionized employees in Ontario working under contracts without seniority provisions increased from 33.5 percent in 1982 to 39.7 percent in 1990. The number of employees working under contracts with seniority as a primary factor in promotion dropped from 25 percent to 22 percent over the same period.[18] Further improvements in these areas are essential to enhancing Canada's long-term international competitiveness.

iv) Canadian Social Support Programs

Canadians have long taken pride in their nation's well developed system of social support, and these programs play an important role in providing assistance to disadvantaged groups. However, social support programs should embody appropriate incentives to encourage those who are able, to seek work and improve their skills.

Some features of Canada's present social support system create disincentives to seek employment actively, keep working, and upgrade skills. Moreover, some individuals who begin the transition to employment may be discouraged from working harder because of the low levels of earned income at which social assistance is reduced. The net result is a system that perpetuates the old economic order and works against upgrading.

Welfare Programs and Incentives: In Canada, the head of a household with three dependents can receive social assistance totalling close to $23,000 a year, as well as significant non-cash benefits. Some have argued that Canada's spending on social assistance is too high, while others claim that it is grossly insufficient. Canadians must ultimately decide whether the country's absolute levels of assistance are appropriate. Whatever these levels, our concern is whether Canada's welfare programs provide structural disincentives for those receiving assistance -- but who want to work -- to seek and obtain employment and upgrade their employment-related skills.

Earned income exemption levels vary substantially between provinces. For example, Ontario's relatively generous Support To Employment Program (STEP) provides monthly exemptions for both General Welfare and Family Benefits assistance of $175 plus 20 percent of net income over $175 (single parent, one child). Saskatchewan, by contrast, provides no income exemption for the first three months of employment (benefits are 100 percent recovered), and limited exemptions thereafter. In Quebec, the monthly exemption for a single parent with one child is $88; exemptions in other provinces fall within this range.[19] Thus, while most provincial assistance programs do contain earned income exemptions, the exemption levels are typically very low -- an individual will lose between 66 cents and $1 of assistance for every dollar of income earned.[20] In seeking to recover a significant portion of social assistance payments from recipients who obtain part-time employment, the provincial governments impose effective tax rates well above the highest marginal tax rates in the country, and create a potent disincentive to work.

These high effective tax rates -- in some instances 100 percent -- combined with the low levels of income at which benefits are removed, and the prospect of losing valuable non-cash benefits once a recipient enters full-time employment, do little to encourage those receiving benefits to seek higher paying jobs or to acquire the skills that would enable them to enter and remain in the labour force. Rather than encouraging social assistance recipients to attain independence, Canada's provincial welfare systems create a host of financial disincentives for those who try to do so.[21]

Unemployment Insurance: In 1990, Canada spent approximately C$13 billion on unemployment insurance (U.I.). The U.S., with a population ten times that of Canada, spent US$18.4 billion. The average weekly unemployment benefit in Canada was C$231 in 1990; in the U.S. it was the equivalent of C$187.[22]

Once again, the important issue is the incentives that Canada's system provides. Canada's generous unemployment insurance system has been directed at income maintenance rather than at encouraging skills development. Despite recent reforms that have increased the minimum period of work needed to qualify for benefits, qualification requirements for unemployment insurance remain low compared to those of other industrialized countries. Depending on the regional unemployment rate, an individual can qualify for U.I. benefits after as little as ten weeks of work (the average number of weeks required to qualify is between 14 and 17). By comparison, both Japan and France require 26 weeks of work during the previous year to qualify, while Germany requires 30 weeks during the last year plus 52 weeks during the last three years.[23] This feature of Canada's program has long been criticized because it blunts incentives for individuals to upgrade skills and/or migrate to regions offering better employment prospects. The Canadian system of unemployment insurance may also have encouraged wage costs in depressed regions to rise above levels supportable by market forces, thus deterring business from expanding or locating in high-unemployment regions.[24]

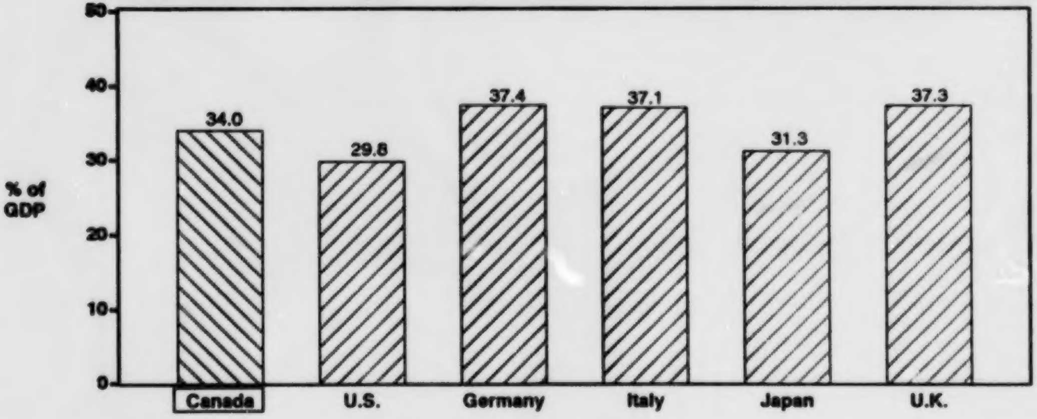
A particularly vivid example of how Canada's short U.I. qualification period works against competitiveness is found in the Atlantic fishing industry. Inshore fishermen will often work the minimum ten weeks and then stop fishing in order to collect U.I. At times, this pattern has led to product shortages for fish processors, because a portion of their catch quota remained unharvested. Within their plants, processors sometimes face similar problems: some plant employees work for ten weeks and then quit, leaving companies with labour shortages and/or having to scramble to staff their plants in the final weeks of the season.

Overall, the federal government estimates that workers who "voluntarily leave their jobs without just cause collect more than $1 billion dollars in U.I. benefits each year."[25] Although recent reforms to the U.I. system have increased the penalties facing those who quit their jobs without just cause, or refuse a suitable job offer, it continues to provide insufficient incentives to greater workforce participation.[26]

The Future of Income Support Programs: The provision of a strong safety net in Canada has been accompanied by a need to raise large amounts of tax revenue. As a percentage of GDP, however, Canada's tax and social security contributions are in line with those of most G7 countries (see Figure 9.3). In 1988, total tax revenue and social security contributions collected in Canada were equivalent to 34 percent of GDP. This compared to just under 30 percent in the U.S. and a high of 37.4 percent in Germany.

Figure 9.3

TOTAL TAX AND SOCIAL SECURITY CONTRIBUTIONS AS A % OF GDP, SELECTED COUNTRIES, 1988



SOURCE: OECD, *Revenue Statistics of OECD Member Countries*, 1990

While Canada's total social spending as a proportion of GDP is also generally comparable with that of most other industrialized countries, this is somewhat misleading. Thus far, Canada has been able to hold down the tax burden because Canada's relatively younger population has meant that the impact of an aging population on social security and health care costs has been felt less strongly here than in European nations.[27] European countries are currently supporting a more mature system -- the ratio of people 65 years and older to the total population aged 15 to 64, for example, is 23.4 percent in Germany, 21.9 percent in France, and 23.2 percent in the U.K., compared to 14.1 percent in Canada. This indicates that Canadian public pension costs and health care expenditures will rise sharply as its population ages and its system reaches the maturity levels of Europe.[28]

Yet despite its younger population, Canada's overall tax burden is already roughly equal to that of several European countries with significantly older populations. In order to provide the same standard of social security and health care now available, substantial tax increases will likely be necessary in the future. By one estimate, the "social security tax" levied to finance the Canada Pension Plan, for example, will have to increase from its current level of about four percent of pensionable earnings to 13.7 percent by the year 2035.[29]

The trend toward an aging population will place significant strains on Canada's ability to maintain spending for social programs, while also funding other areas of government activity such as infrastructure development and education. By fueling higher taxes, this trend could also negatively affect individual incentives to work hard and improve skill and education levels in the years ahead, unless the tax structure and design of benefits programs is changed.

v) Attitudes Toward Competition and Risk

While it is notoriously difficult to generalize about national characteristics, Canadian attitudes toward competition and risk seem to have traditionally reflected a greater emphasis on security, and a somewhat weaker attachment to the virtues of competition, than those in some other countries. These attributes, which are a reflection of the old economic order, are consistent with an environment in which there were few external or internal pressures to innovate and upgrade.

Many observers have characterized Canada as a relatively cautious, risk-averse society. Evidence of this can be found in a number of indicators. Canadian consumers appear less willing to try new products than U.S. consumers. As cited in a recent study by Seymour Lipset, Gallup Polls have found that Americans are almost twice as likely to test out new products or services as Canadians.[30] (This is consistent with the findings from our industry studies discussed in Chapter 7.) Canadians also have less capital invested in equity and real estate, and more in RRSPs and life insurance, than do Americans. One observer commented that Canada is "lacking in entrepreneurial spirit," and that in Canada "there seems to be less willingness to risk capital or reputation; in contrast to America, Canada is a country of greater caution, reserve and restraint."[31] According to research conducted by the Canadian Foundation for Economic Education, entrepreneurial effort and achievement are less honoured by schools and businesses in Canada than in the U.S., Japan or Britain.[32] These indicators suggest that risk-taking, so vital to the process of innovation, may often be lacking in Canada.

This reluctance to take risks also affects the labour force. Job security has been of critical importance to Canadian unions throughout the 1980s. Unions in Canada have shown less interest in linking wages to productivity, or in participating in profit sharing plans, than their counterparts elsewhere. Of the collective agreements reached in Canada in 1989, only two percent provided for wage incentives linked to productivity gains, while just 0.5 percent had profit sharing plans; on the other hand, 23.5 percent had an income guarantee against the introduction of "technological change" in operations.[33] In the U.S., almost 15 percent of collective agreements reached in 1988 had some form of profit sharing plan.[34]

3. CANADIAN RIVALRY

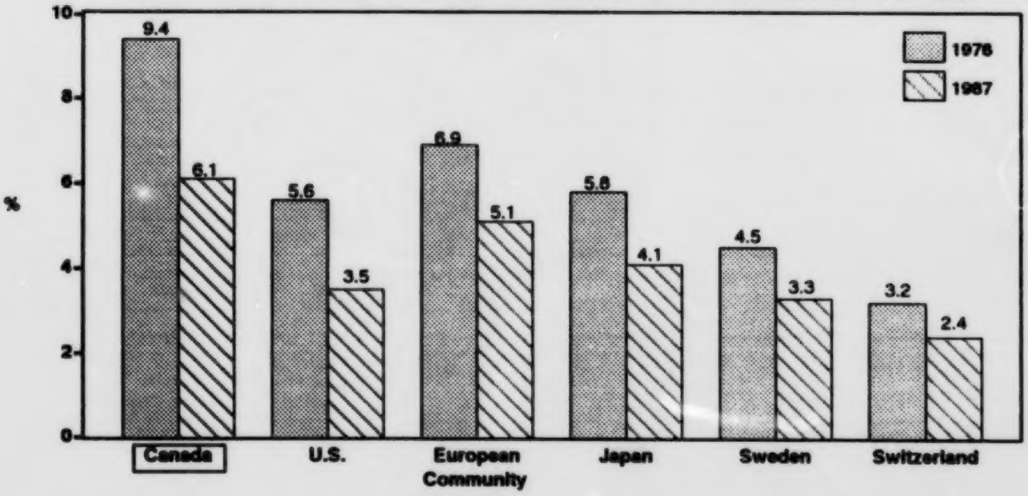
One of the strongest empirical findings from the ten-nation research was the association of vigorous domestic rivalry with the creation and persistence of competitive advantage. In every country surveyed, internationally successful industries almost invariably experienced intense domestic competition. This belies the notion prevalent in much economic literature, including some Canadian literature, that governments should nurture one or two firms in an industry, which will then attain the scale and strength to compete against foreign rivals. Research for the ten-nation study demonstrated that this "national champion" approach ultimately proved counterproductive. It rests on a static conception of competition, and fails to take into account the crucial role that local rivalry plays in stimulating firms to upgrade their capabilities and sharpen their competitive instincts. There are, of course, some industries in which only a handful of global players exist, such as aircraft manufacture, aluminum, flight simulators and central office switches, but these are examples where scale considerations have compelled firms to compete globally. Even in such industries, the nation with competitive advantage is often the one that has managed to support the most direct or indirect rivalry -- the U.S. in aircraft and Canada in switching equipment, for example.

A. Protection from External Pressures

The domestic orientation and slow rate of upgrading in many Canadian industries cited earlier has been encouraged by limited exposure to external competitive pressures. The National Policy (1879) established tariff barriers in Canada that, over succeeding years, provided Canadian industry -- especially secondary manufacturers -- with sturdy shelter against foreign competition. Even after the full phasing-in, by 1987, of tariff reductions agreed to during the GATT Tokyo Round in the 1970s, Canada's weighted average tariff rate on imported goods remained substantially higher than that of other developed nations (see Figure 9.4). This history of protection from external pressures served not only to limit the exposure of Canadian firms to foreign competitors, but also lessened the incentives for Canadian-based companies to improve their own products or services. Firms could achieve acceptable profitability by sticking to the Canadian market. Few incentives existed to compete in more "hostile" foreign markets.

Figure 9.4

WEIGHTED AVERAGE TARIFF RATES ON TOTAL IMPORTED GOODS, SELECTED COUNTRIES

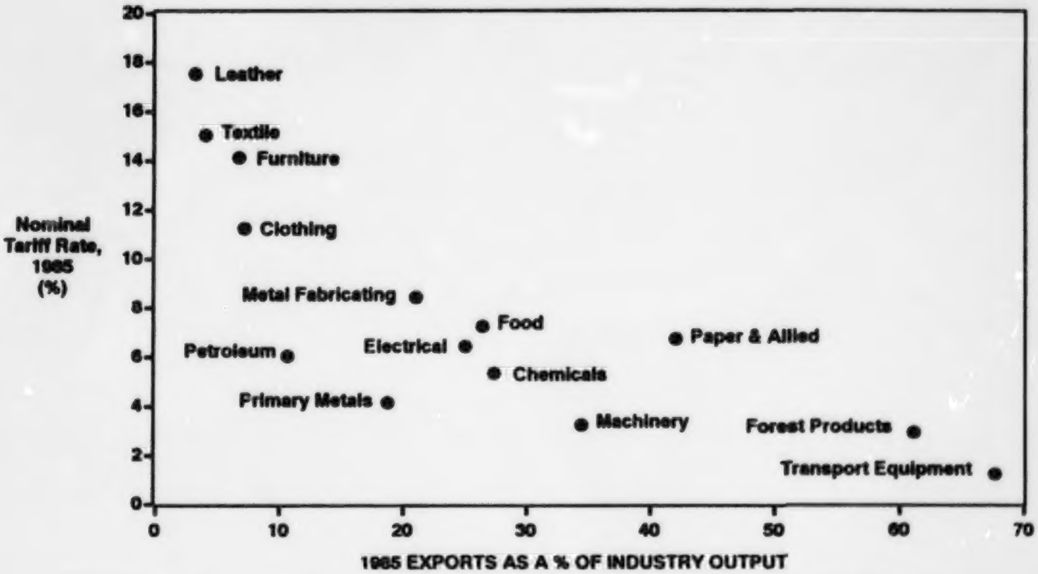


SOURCE: THE ROYAL COMMISSION ON THE ECONOMIC UNION AND DEVELOPMENT PROSPECTS FOR CANADA, VOL II, PAGE 153

Figure 9.5 shows a strong inverse correlation between the level of tariffs and the propensity of industries in Canada to export. This picture suggests that a lack of competitive pressure in the home market left those firms operating with tariff protection less well prepared to compete internationally.[35]

Figure 9.5

CORRELATION OF NOMINAL TARIFF RATE WITH EXPORTS, 1985

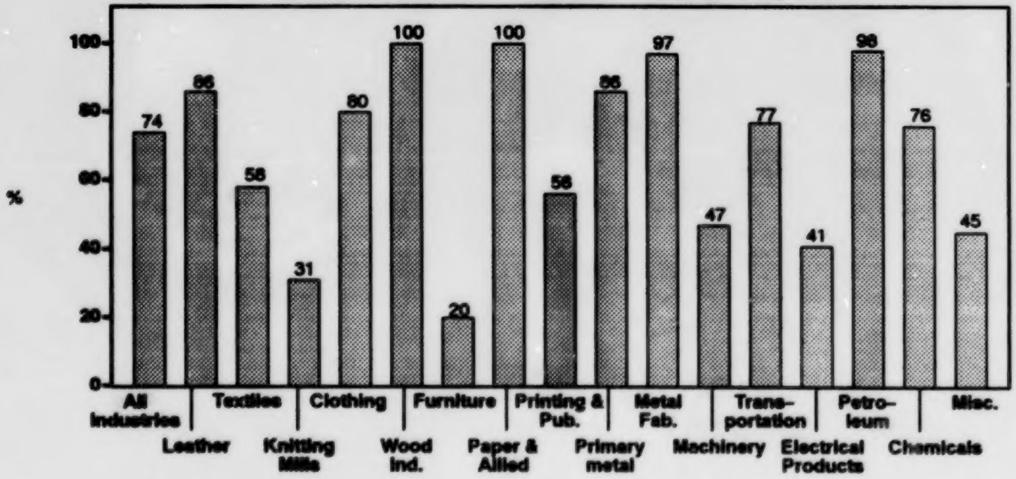


SOURCE: STATISTICS CANADA; ECONOMIC COUNCIL, *ADJUSTMENT POLICIES FOR TRADE SENSITIVE INDUSTRIES*, 1988; MONITOR COMPANY ANALYSIS

Other studies have shown that industries with high tariffs and high concentration are significantly less efficient (below Minimum Efficient Scale) than low-tariff industries with an orientation to external markets. For example, the primary metals industry in Canada (nominal tariff rate of 5.2 percent in 1985) operates at a much more efficient scale (86 percent of U.S. average plant size) than the electrical products sector (10.7 percent nominal tariff rate in 1985 and only 41 percent of U.S. average plant size).[36]

Figure 9.6 illustrates the degree to which the scale of Canadian plants in 1979 (the latest available data) fell short of American plants. Revealingly, "wood industries" and "paper and allied," two of Canada's most successful exporting industries, operate at a size roughly equivalent to the United States. Consistent with the findings discussed earlier, the average Canadian machinery plant is not even one-half the scale of the average U.S. plant, thus making it difficult for Canadian firms to be cost competitive with U.S. players.

Figure 9.6
CANADIAN PLANT SIZE RELATIVE TO U.S. PLANT SIZE, 1979*



* Latest available data

SOURCE: BALDWIN AND GORECKI, *Trade, Tariffs And Relative Plant Scale In Canadian Manufacturing Industries, 1970-79* (1984)

B. Paucity of Domestic Rivals

In addition to experiencing limited external competitive pressures, Canadian-based firms have traditionally faced relatively few internal pressures to upgrade their operations, innovate or service markets outside of Canada. Weak rivalry can be ascribed to factors such as high levels of concentration in many industries; a historically ineffective competition policy; the effects of interprovincial trade barriers in limiting competition in local markets; and the limited addition to competition created by newly formed businesses, which have rarely been able to achieve sufficient size to challenge existing firms.

I) High Levels of Industry Concentration

The Canadian economy has long been characterized by high levels of industry concentration. They provide an indication that the scope for fierce rivalry among multiple players has often been absent in the Canadian market.

A common measure of industry concentration is to compare the ratio of sales of the four largest firms in an industry to total sales in that industry (the so-called CR_4 ratio). Using a specialized industry series comparing Canadian and U.S. levels, one study found that 46.2 percent of Canadian manufacturing industries had a CR_4 ratio of more than 50 percent, while the comparable figure for the U.S. was only 28.5 percent (see Figure 9.7).37 Although this is already a significant difference, the findings are even more striking when compared to highly concentrated industries. Almost one quarter (23.7 percent) of Canadian manufacturing industries had a CR_4 ratio of greater than 70 percent, compared to only 8.5 percent of manufacturing industries in the United States.38

Figure 9.7

DISTRIBUTION OF CR_4 LEVELS OF CANADIAN AND U.S. MANUFACTURING INDUSTRIES

FOUR FIRM CONCENTRATION LEVEL (CR_4)	NUMBER OF INDUSTRIES	% OF TOTAL INDUSTRIES	% OF TOTAL VALUE OF SHIPMENTS	TOTAL VALUE OF SHIPMENTS
Canada (1980)				
Greater than 80%	18	10.7%	11.8	19.9
Greater than 70%	40	23.7%	23.3	39.3
Greater than 60%	60	35.5%	36.2	60.9
Greater than 50%	78	46.2%	46.6	78.5
Total	179*			168.3
U.S. (1977)				
Greater than 80%	22	4.9%	7.5	101.9
Greater than 70%	38	8.5%	11.3	153.2
Greater than 60%	71	15.9%	19.1	258.9
Greater than 50%	27	28.5%	26.7	362.8
Total	445			1,358.8

***A lower level of aggregation for Canadian data actually understates the level of concentration**

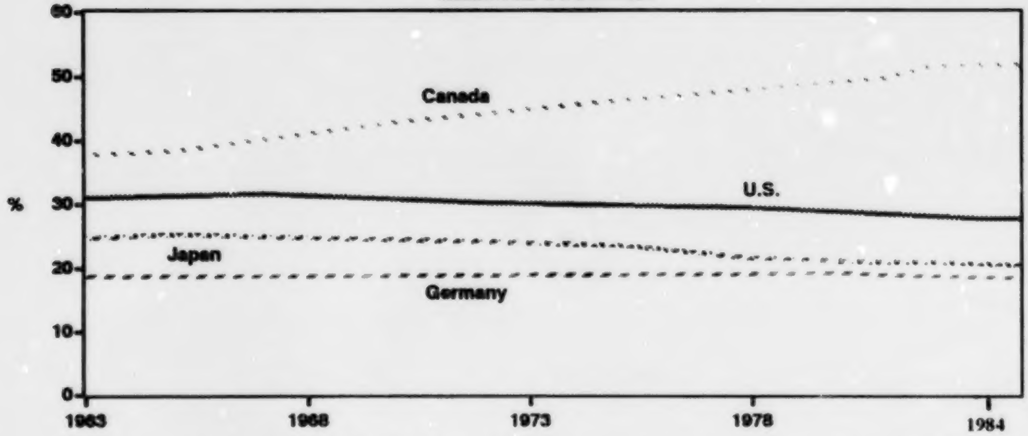
SOURCE: R.S. KHEMANI, "THE EXTENT AND EVOLUTION OF COMPETITION IN CANADA", IN MCKETRIDGE, *Canadian Industry In Transition*, (1986) 153

In comparing Canadian industry concentration levels with a more similarly sized economy -- Australia -- Canada's CR_4 levels appear higher. Across a variety of manufacturing industries, ranging from food, beverages and tobacco, wood products, and textiles to non-metallic mineral products and transport equipment, Canadian concentration levels (both CR_4 and CR_8) were typically higher than those in Australia.39

Aggregate concentration levels in Canada are also higher. Figure 9.8 charts aggregate concentration levels in four economies -- the U.S., Canada, Japan, and Germany. It measures the share of total assets held by the 100 largest non-financial corporations in each country. Canada's 100 largest firms own a much higher percentage of total assets than is the case for identical groupings of firms in the other three countries. The chart also shows that the gap between Canada and its international competitors increased during the period.40

Figure 9.8

SHARE OF TOTAL ASSETS HELD BY THE 100 LARGEST NON-FINANCIAL CORPORATIONS, SELECTED COUNTRIES



SOURCE: KHEMANI, SHAPIRO AND STANBURY, EDS., *Mergers, Corporate Concentration and Power in Canada*, 1988; MONITOR COMPANY ANALYSIS

A 1986 study by Khemani compared the extent of competition in the Canadian economy to that in the United States. After developing a model that classified all industry sectors as "oligopolistic," "government regulated," or "effectively competitive," he found that, with the exception of the construction industry, the U.S. was more "effectively competitive" in every sector than Canada. Overall, 77 percent of the American industries surveyed operated in competitive markets, versus 44 percent in Canada.[41]

ii) Ineffective Competition Policy

High levels of industry and aggregate concentration in Canada have been encouraged by the country's historically weak anti-combines law, which left significant room for mergers. In addition, the Crown's limited success in prosecuting merger and monopoly cases (only one conviction between 1889 and 1986) did little to discourage this kind of activity.[42] Competition laws in Canada, however, were strengthened in 1986. As discussed later in the chapter, they currently provide a much more effective tool to enhance rivalry in the Canadian market. For example, the Competition Bureau now plays an active role in assessing the anti-competitive impact of mergers, and is monitoring or has made modifications in roughly eight percent of mergers examined.[43] However, historically weak competition laws have left a profound legacy in Canadian industry which will take many years to undo.

iii) Interprovincial Trade Barriers

Longstanding barriers to interprovincial trade have compounded the weakness of domestic rivalry in Canada. A myriad of conflicting regulations and policies (by one count numbering over 500 trade barriers) has impeded the free flow of goods, services, capital and human resources between provinces, and effectively encouraged inefficiencies in firm operations and investments.[44] These barriers have also reinforced an insular attitude among firms, some of whom have remained successful in part by taking advantage of the lucrative opportunities afforded by protected local markets.

Interprovincial trade barriers have imposed significant costs on the Canadian economy. These have been roughly estimated by the Canadian Manufacturer's Association to be in the range of $6.5 billion per year.[45] This represents the potential savings that could be achieved by removing all interprovincial barriers affecting government procurement, agriculture, beer and wine, and labour mobility. Equally important, if not more so, however, would be the gains in innovation and upgrading that would flow from increased firm rivalry.

Figure 9.9 underscores the extent to which an opportunity for increased interprovincial trade and competition exists in Canada, though it is an indirect measure. Examining the destination of shipments by province in 1984 (the latest year for which such statistics are available) reveals that approximately 43 percent of all goods produced in Canada were sold in their province of origin. The percentage sold in export markets -- 32 percent in 1984 -- was, in fact, greater than the percentage sold among provinces (25 percent). While geographic proximity to markets in the U.S. certainly accounts for some of this skew, interprovincial barriers are also a factor. As the Royal Commission on the Economic Union and Development Prospects for Canada noted in 1985, "for a Canadian producer to find it easier to sell in foreign markets than in another province is inconsistent with the full development of our national community."[46] Removing external barriers through the Canada-U.S. Free Trade Agreement prior to successfully tackling the problem of interprovincial barriers has made the adjustment process Canadian firms must undertake more challenging.

Figure 9.9

DESTINATION OF SHIPMENTS BY PROVINCE, 1979 AND 1984

	TOTAL VALUE OF GOODS PRODUCED*		% WITHIN PROVINCE		% WITHIN CANADA		% EXPORTS	
	1979	1984	1979	1984	1979	1984	1979	1984
Newfoundland	$2.3	$2.6	28%	34%	21%	13%	51%	53%
P.E.I.	$0.4	$0.6	40%	34%	39%	40%	21%	26%
Nova Scotia	$4.1	$6.0	40%	43%	34%	31%	26%	26%
New Brunswick	$3.9	$5.2	29%	32%	29%	33%	42%	35%
Quebec	$46.0	$66.1	48%	47%	28%	27%	24%	25%
Ontario	$84.7	$136.3	47%	44%	25%	21%	28%	35%
Manitoba	$6.2	$8.5	35%	39%	41%	37%	24%	24%
Saskatchewan	$6.6	$11.9	25%	26%	29%	26%	46%	48%
Alberta	$26.3	$48.6	39%	39%	34%	37%	27%	24%
British Columbia	$21.7	$26.3	45%	49%	15%	11%	40%	39%
Yukon / Northwest Territories	$0.7	$1.1	31%	51%	8%	13%	61%	35%
Canada	$202.8	$313.4	44%	43%	27%	25%	29%	32%

* In billions of nominal dollars

SOURCE: STATISTICS CANADA SPECIAL SURVEY, INTERPROVINCIAL TRADE FLOW DATA, INPUT-OUTPUT DIVISION, 1990

Barriers to interprovincial trade typically have arisen as a consequence of government policies that sought to foster localized economic development. The most significant of these barriers include discriminatory government procurement practices, agricultural support programs, policies that restrict labour mobility and distribution restrictions.

Government Procurement: As was discussed in greater detail in Chapter 7, tendering for government contracts in most provinces has generally favoured local suppliers through price preferences, local presence requirements or limitations on subcontracting. This has reduced competition from both out-of-province and out-of-country vendors, and weakened incentives for local firms to innovate and to expand operations to serve other markets. Preferential tendering practices have fostered relationships of dependency for firms heavily linked to government contracts, and made it less likely that such firms will seek out external markets. Local content requirements have contributed to substantial market fragmentation in some industry sectors and encouraged the establishment of sub-scale plants.

Agricultural Support Programs: Barriers to interprovincial trade in agricultural products have long hampered the development of an efficient agricultural sector, and have been a potent obstacle to the ability of Canadian food processors to compete in international markets. Chapter 2 provided evidence of this by illustrating Canada's weakness in processed food products despite strengths in basic foods.

As noted in Chapter 6, supply management programs and marketing boards, by regulating provincial production levels via quotas, have established artificially high prices for key inputs such as eggs, industrial milk, turkeys and chickens. Provincial border controls have further inhibited the interprovincial flow of products, particularly in the case of commodities that are supply-managed. These barriers have had substantial effects on the cost and availability of controlled agricultural commodities; one recent estimate put the cost at $1 billion.[47] Canadian-based food processors have little choice but to pay the added cost, as import restrictions effectively eliminate opportunities to source supply from outside the country. Finally, many provinces have imposed restrictive standards and packaging requirements that place additional costs on out-of-province producers. For example, a 1984 rule set by the Quebec government required that fresh tomatoes be sold in imperial measure containers; when Ontario producers sent tomatoes to Quebec in metric containers, the shipments were returned.[48]

Mobility Restrictions: Restrictions on labour mobility constitute another category of interprovincial barrier. The licensing and certification of trades, professional services and businesses rests with the provinces. Unfortunately, there has been a lack of uniformity and reciprocity in the treatment of these groups across provinces. Some provinces have also required preferential hiring of local residents in certain occupations or industries (for example, construction). In the consulting engineering industry, barriers to winning out-of-province contracts or utilizing out-of-province employees have slowed the development of linkages between that industry and the construction industry, which is becoming an increasingly critical step in enhancing the construction service skills of consulting engineering firms. Because they cannot compete in all provinces, and cannot transfer the skills and knowledge gathered in these projects across the country, consulting engineering firms have little incentive to establish strong ties with any construction company.

Distribution Regulations: Provincial regulations requiring that domestic beer be produced in the province in order to gain access to distribution have led to an extraordinarily fragmented industry. For example, Molson's largest plant in 1989 had a capacity of approximately 4.5 million hectolitres, compared to a minimum efficient scale in the North American beer industry of approximately 5.3 million hectolitres.[49] In addition, regulations on pricing (imported beers face higher mark-ups) and listing (provinces reserve the right not to allow certain imported beers into the province) further shelter domestic producers from competition and increase costs to consumers. Similar regulations also apply to the marketing and distribution of wine and spirits.

iv) New Business Formation and Rivalry

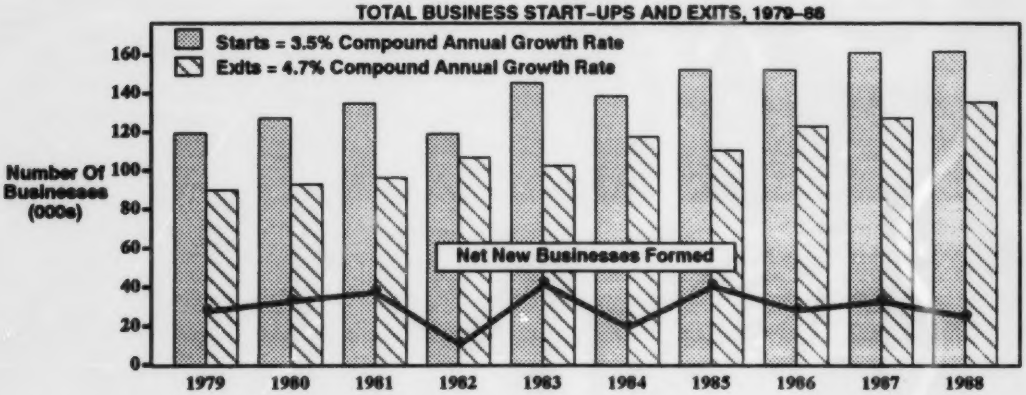
New business formation is important in strengthening the vitality of a nation's economy. It adds directly to the number of competitors in industries. It also spurs the process of upgrading in an industry, often by the use of new technologies, and by challenging established participants through new approaches. New business formation is also essential to the process of mutual reinforcement of an industry diamond; it intensifies the level of domestic rivalry, stimulates the formation of related and supporting industries, and facilitates the deepening of clusters.

Recent work by Baldwin and Gorecki (1991) verifies the importance of the link between new business formation and productivity. Their research on Canada's manufacturing sector suggested that the firm entry/exit process had a positive influence on productivity growth. They found, for example, that the productivity level of new entrant firms quickly rose above the average productivity level of incumbent firms in a given industry.[50]

As Figure 9.10 demonstrates, Canada has enjoyed some success in new business formation. Canada's net rate of new business formation has remained relatively constant over the last ten years, and these businesses have contributed to the overall growth of the Canadian economy, particularly in the area of new job creation. Indeed, Canada's overall per capita rate of new business formation appears to be comparable to that of the U.S., where the record of business start-ups has been reasonably strong.[51]

Figure 9.10

TOTAL BUSINESS START–UPS AND EXITS, 1979–88



SOURCE: ISTC, ENTREPRENEURSHIP AND SMALL BUSINESS OFFICE, 1990

However, new business formation in Canada has not significantly contributed to enhanced rivalry in exporting industries. The vast majority of new businesses have been in the non-goods-producing and non-tradeable sectors. Of the approximately 311,000 new businesses created in Canada between 1978 and 1988, over 70 percent were in sectors such as community services, retail/wholesale trade, self-employed and business/personal services.[52] New businesses in these sectors were created at a rate disproportionate to their representation in the economy as a whole. For example, self-employed persons accounted for nine percent of all businesses in Canada in 1988, yet they contributed over 21 percent of total new businesses formed between 1978 and 1988. By contrast, the manufacturing sector made up six percent of total businesses, yet accounted for only four percent of the new firms formed.[53]

An apparent inability to grow from small to medium-size is another major reason why new businesses have not stimulated more rivalry and innovation in Canada's principal export industries. A recent federal government study of the growth patterns of small and medium-sized businesses in Canada found that slightly more than 50 percent of new businesses survived their first three years of operation.[54] A more detailed examination of business start-ups and exits indicates that only 2.5 percent of Canadian companies with less than 20 employees in operation in 1978 grew beyond that size between 1978 and 1988.[55] Similarly, only ten percent of companies with 20-49 employees expanded beyond that category. The proportion of all small businesses operating in 1978 that passed the threshold to enter the medium-sized sector (more than 100 employees) in 1988 was approximately 0.5 percent. By contrast, 15 percent of small businesses in the U.S. graduated to the medium-sized category over a comparable period.[56] Finally, almost none of the medium-sized companies with 100-499 employees in Canada advanced to the "large company" classification between 1978 and 1988.[57]

As discussed in Chapter 6, one often cited impediment to the growth of small and medium-sized firms in Canada has been access to capital. This has been particularly true among technology-driven firms. During our industry interviews, one senior vice-president in the biologicals industry commented that "it's a long, slow process raising money for high technology companies in Canada. There's much more venture money interested in start-ups in the U.S., even per capita. It's a different mindset."[58] Lack of access to capital to finance growth may be one factor behind the increasing numbers of acquisitions in high-tech and knowledge-intensive industries. Recent examples in the Canadian computer software sector -- Motorola purchasing MDI; Microsoft buying Consumers Software; Computer Associates acquiring Basic Software -- suggest that medium-sized companies are being removed as independent competitors in the market, often by firms with more favourable industry diamonds.

v) Indications of Limited Rivalry

Limited domestic rivalry in Canada has manifested itself in different ways. In some of the industries studied, domestic rivalry is limited in part because competitors serve distinct segments in the same industry. In the urban mass transit rail vehicle industry, the two principal Canadian players, Lavalin Industries and Bombardier, operate practically in isolation from each other. Bombardier's strategy focuses on the replacement vehicle market segment, while Lavalin Industries, through its subsidiary UTDC, concentrates on the design and development of new transit systems. Within the Canadian market, there is little or no geographic overlap in the markets they serve. Each firm has strong linkages to a secure local market: Bombardier in Montreal through its relationship with the Quebec government and the Montreal Urban Community Transit Commission, and Lavalin Industries/UTDC in Toronto through its historical links with the Ontario government and the Toronto Transit Commission. Thus, domestic rivalry has played almost no role in the development of the Canadian industry.

A pattern of serving distinct markets also characterizes the fish processing industry. Historically, the industry has been highly fragmented with numerous single- and multiple-plant processors. Rather than competing, maintaining jobs in the community has been an overriding concern for most competitors in the industry, as well as for governments that have exerted strong influence over firms. A long history of indirect government support and occasional bailouts has dulled local rivalry.

The emergence of two large, vertically integrated competitors by the mid-1980s initially did little to alter the degree of domestic rivalry. National Sea Products concentrated its marketing efforts primarily at the retail level, supplying branded products such as Captain Highliner, while Fishery Products International sold almost exclusively to the institutional market. Opportunities for vigorous local rivalry were limited. This has begun to change within the last few years, however, as both players are now supplying the retail and institutional market segments.

In the market pulp industry, although rivalry exists, it has not yielded the gains in innovation and productivity that often arise from competition among multiple competitors. Rivalry in this industry is focused on price, rather than on developing improved technologies. Providing a commodity product of adequate quality is the essential requirement; this understandably leads to a corresponding emphasis on price competition. Instead of focusing on improving technologies to gain cost advantages, the pulp and paper industry has relied on ongoing cost management to achieve lower prices. In fact, the industry is characterized by close cooperation and sharing of knowledge in all areas of technological development, often relying on industry associations to serve as organizing and disseminating agents. While this has undoubtedly lowered R&D costs, it has also reduced the pressure on firms to innovate independently and gain proprietary competitive advantages. As one industry executive commented: "We're rivals, but we're not enemies." Another stated that "the technical side of things is very open. There isn't much proprietary technology, or certainly not for very long."[59]

While our studies revealed examples in which domestic rivalry had positively influenced the development of a strong diamond, these cases were the exception. Yet the exceptions offer striking evidence of the ability of rivalry to spur innovation. For example, intense domestic rivalry characterizes the consulting engineering service industry. Medium-sized players such as UMA, Golder and Sandwell battle fiercely in the local market against the more internationally recognized consulting engineering firms such as SNC/Lavalin, H.A. Simons and Monenco, and against small, local niche players. Strong rivalry at home is matched by active rivalry internationally. Canada is one of the few countries in which two or more domestic firms will bid against each other for international contracts.

The result of this competition at all levels is two-fold: first, profit margins tighten, necessitating innovation and increased efficiencies; second, all companies develop a heightened awareness of each other's actions, leading to competition for the best personnel and furthering the diffusion of new technologies and ideas. Examples of rivalry-induced innovations include superior irrigation systems and forest product plant designs, and more advanced computer design systems that decrease design and subsequent modification times.

Domestic rivalry in the Canadian ice skate industry has also been intense, stimulating considerable innovation. The industry has profited from this rivalry and innovation, even though there are only a small number of domestic players. The intensity of the rivalry has developed over several decades. CCM Sports Maska was at one time the world's top skate company, controlling more than 50 percent of the market. However, the positions of the major companies are now reversed, with Canstar, CCM Sports Maska's primary competitor, now controlling 60 percent of the market. Canstar's key competitive strength is its commitment to superior product development. Its product line -- either completely new or substantially revamped since the early 1980s -- now includes the pre-eminent brand names in the industry: Bauer, Micron and Lange. *Canadian Business* cited Canstar as "a unique example of a mid-sized Canadian company whose entire *modus operandi* is driven by its commitment to industrial design."[60]

In several of the successful industries studied there was effectively only a single Canadian-based rival. This was the case, for example, in central office switches, flight simulators, commuter aircraft and radiation therapy equipment. Lack of domestic rivalry in these instances did not result in disadvantage, because the few countries with viable competitors were often in the same position. The lack of domestic rivalry, however, elevated the importance of the other determinants in fueling Canadian competitive advantage.

C. Strong Profitability

Overall, a combination of factor abundance, high levels of effective tariff protection, and a lack of vigorous domestic rivalry in many sectors has allowed Canadian firms to generate a strong profit performance. One study by Mueller, comparing the average profitability for a sample of manufacturing firms over the period 1964 to 1982, found that profits in Canada were higher than in its major international competitors.[61] Average margins of 13.7 percent in Canada exceeded those of the U.S. (8.4 percent), the U.K. (9.8 percent), Germany (4.8 percent) and Japan (6.4 percent). Utilizing more macro indicators, OECD rate of return figures suggest that Canada's return on capital in all industry sectors was second only to the U.S. among G7 countries from 1980 to 1990 (see Figure 9.11).

Figure 9.11

AVERAGE RETURN ON CAPITAL, 1980–90, SELECTED COUNTRIES

COUNTRY	AVERAGE RATE OF RETURN*
U.S.	17.8%
Canada	15.3%
Japan	14.7%
Italy	14.1%
Germany	12.8%
France	12.1%
Sweden	10.2%
U.K.	9.5%
Switzerland	7.6%

*Average rate of return is defined as $\frac{\text{Total Value Added – Compensation}}{\text{Total Capital Stock}}$

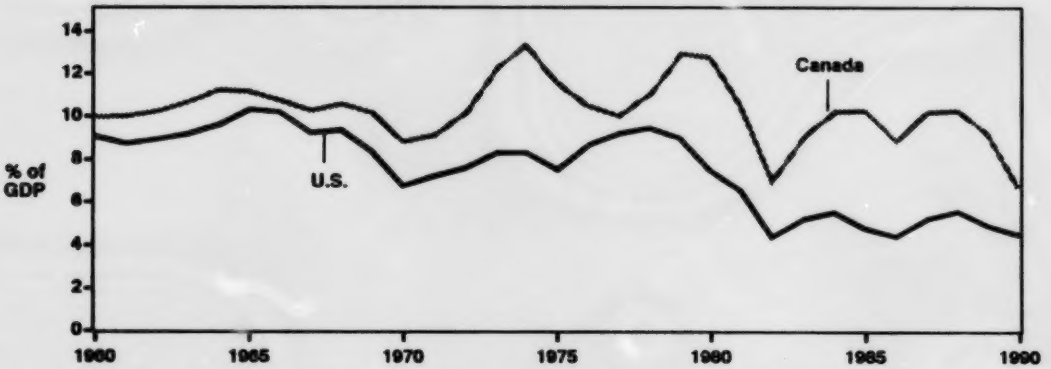
where capital stock equals assets included in non–residential fixed capital formation

SOURCE: OECD, ECONOMIC OUTLOOK, JUNE 1990, TABLE 53

Another sign of profitability is that pre–tax profits as a percentage of GDP have been higher in Canada than in the U.S. in every year since 1960, as shown in Figure 9.12. However, both countries have seen an overall decline in profit contribution since the early 1980s.62 In Canada, the 1990–91 recession has driven profits down to extremely low levels.63 The trend in Canadian profitability since the 1970s is a further indicator that Canada's old economic order is vulnerable.

Figure 9.12

PRETAX PROFITS AS A % OF GDP, U.S. AND CANADA, 1960–90



SOURCE: STATISTICS CANADA; U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS

Although some caution must be used in comparing return on sales (R.O.S.) figures between Canada and the U.S. -- given a potentially higher asset intensity because of Canada's large resource sector -- an examination of the North American manufacturing sector revealed that pre–tax return on sales in Canada between 1974 and 1989 equalled or exceeded the comparable measure for the U.S. in ten out of 16 years, averaging 6.85 percent versus 6.59 percent in the United States. On an after–tax basis, however, Canada's R.O.S. equalled or exceeded the U.S. level in only six out of 16 years, averaging 4.2 percent versus 4.6 percent in the United States.64 Moreover, profitability has been achieved in many sectors of the Canadian economy in which plants are smaller and output per employee is lower than in the United States. In the textile industry, for example, average R.O.S. in Canada was over five percent in 1989 versus two percent in the U.S., while output per employee in Canada was lower (65 percent of U.S. levels) and hourly compensation higher (103 percent of U.S. levels).[65]

Overall, it appears that many industries in Canada have historically generated rents, in some cases because of strong resource endowments, and in others because of protection of local markets, the presence of high tariffs, and a lack of intense rivalry. These rents were then distributed among firms, in the form of higher profits; labour, in the form of higher wages; governments, through the ability to levy higher taxes; and finally, as demonstrated by Bloch (1974) and Caves, Porter, and Spence (1980), a significant portion of potential profits in protected Canadian industries was lost through technical inefficiencies.[66] In many cases, this meant that Canadian consumers were left paying higher prices for goods and services.

Findings from a recent Ernst and Young study are consistent with the pattern we have discussed. After a detailed examination of Canadian and U.S. distributor channels for various consumer products, Ernst and Young concluded that a primary driver of higher prices in the women's sportswear category, for example, was that "in Canada a small number of manufacturers, distributors and retailers account for larger percentages of total market volume [than in the U.S.]. This leads to less price competition among participants . . ."[67]

D. Extended Participation in the Canadian Market

A relatively comfortable Canadian market has meant that firms have typically grown by extending their participation in the domestic marketplace rather than by actively pursuing international expansion and external markets. This has led Canadian firms to develop overly broad product lines, to undertake high levels of vertical integration and to diversify into unrelated businesses. Combined with a limited international presence, this has left Canadian firms particularly vulnerable to attack from more specialized, internationally focused competitors.

I) Broad Segment Scope

In order to grow, many firms in Canada have expanded operations horizontally and chosen to compete in a large number of product categories. In the consumer products sector, to take one example, our research found that many major Canadian competitors have broader product lines than their U.S. counterparts. In some cases this has led to order-of-magnitude differences in sales volume per product, reducing productivity. A similar situation exists in the alcoholic beverage industry: Seagram supplies the Canadian market with almost every type of light and dark spirit (scotch, Canadian whisky, vodka, rum, bourbon) as well as competing in the wine cooler category.

Because product lines are broad, the number of competitors is dampened. Indeed, the vast majority of products in many segments are manufactured by a small number of firms. In a recent study examining product concentration levels, 57 percent of five-digit SIC product categories manufactured in Canada had CR4 levels of 100 percent.[68]

ii) High Levels of Vertical Integration

Many firms in Canada have also expanded through extensive vertical integration. Although no hard evidence could be found that Canada has distinctly higher levels of vertical integration than other nations, the significant extent of vertical integration remains a problem for several firms in the industries studied. This often occurred in cases where the value of linkages between downstream and upstream activities is unclear.

One example of this tendency is the case of Groupe Lavalin. In 1986, Lavalin Industries Inc. purchased 85 percent of the Urban Transit Development Corporation (UTDC) and, through Kemtec Petrochemical Corporation, the assets of the Gulf-Ultramar petrochemical refinery in Montreal. Both were purchased in an attempt to expand upon Lavalin's technical abilities in refining, systems and transportation/construction management. Lavalin management believed that its newly acquired Kemtec assets would allow it to leverage Lavalin's abilities in petrochemical plant and systems design. The UTDC purchase was designed to allow Lavalin to vertically integrate downward into the manufacture of transportation systems, bringing its design and project management expertise to the businesses; it was also meant to generate engineering business for parent company engineering subsidiaries. Both UTDC and Kemtec have been extremely costly, however, in terms of both management time and financial losses. Prior to the takeover of all engineering operations by SNC, Lavalin had announced that it intended to sell all of Kemtec and half of its stake in UTDC in order to rearrange its activities to again focus on its core strengths in consulting engineering and project management.

BCE provides a further examples of unsuccessful vertical integration. The decision to enhance the company's presence as a real estate developer -- managed through a newly formed subsidiary, BCED -- proved unsuccessful, as the subsidiary registered consistently poor performance and was subsequently sold.

There are, of course, examples of firms successfully integrating backward and forward to enhance competitive positions, though they tend to be exceptions. Alcan's move into hydroelectric power generation, and CAE Electronics' backward integration into components manufacturing for its flight simulators, provide evidence that carefully considered vertical integration can yield sustainable competitive advantage.

iii) Excessive Diversification

To achieve growth, some firms have also undertaken expansion into a broad range of essentially unrelated industries. This has helped fuel the rapid growth of conglomerates in Canada. The compound annual growth rate in total conglomerate assets between 1977 and 1985 was 24.3 percent, more than double the rate of total corporate sector asset growth (11.8 percent). As a percentage of total corporate assets in Canada, conglomerates represented 16 percent in 1985, up from seven percent in 1977.[69] These conglomerate acquisitions, however, were often in industries unrelated to core businesses.

As much previous research has shown, unrelated diversification rarely yields long-term competitive advantage and Canadian competition has undoubtedly suffered from the significant presence of unrelated diversification in this country. Recognizing this fact, several of Canada's conglomerates have recently sold off unrelated assets in an effort to focus on core businesses. Over the last ten years, Argus/Hollinger has divested its interests in Massey-Ferguson, Dominion Stores and Norcen Energy. It has concentrated on building a substantial presence in media-related businesses and has acquired controlling interest in such companies as *The Daily Telegraph*, Sterling Newspapers, American Publishing Company and *Saturday Night Magazine*. Likewise, in 1985, Canadian Pacific began a divestiture program that led to the sale of its interests in CP Air, Algoma Steel, Cominco and Maple Leaf Mills, allowing it to concentrate its efforts on the ground/sea transportation and natural resource sectors.[70]

4. GOVERNMENT POLICIES AFFECTING FIRM STRATEGY, STRUCTURE AND RIVALRY

Government policy influences the way firms are managed, set goals and compete. Particularly important are policies that foster strong competition in the domestic market. When policies encourage an international outlook, provide appropriate incentives to invest and expend effort, and enhance new business formation, they create an environment that facilitates the building of long-term competitive advantage.

Historically, however, Canadian government policy has too often worked against these aims. It has not been centrally focused on encouraging firms to upgrade their competitive advantages. Important changes in policy direction over the last decade, however, have begun to alter this situation. Paramount among these changes has been the decision to enter into a Free Trade Agreement with the United States. In addition, the reform of Canada's competition laws, implementation of a federal privatization program, some scaling-back of government regulation, and various tax reform initiatives all represent positive developments that will improve the competitive environment for Canadian-based firms. Significant challenges still exist, however -- for example, in the area of interprovincial trade barriers -- and further efforts are needed.

A. Policies Affecting International Orientation

Sustaining and improving competitive advantage requires that a nation's firms take a global approach to strategy. Government policies should actively encourage an international outlook and export focus among firms. Governments can play a role in these areas through regulation of foreign investment, export promotion and awareness programs, and through policies to secure access to foreign markets.

The Canadian government has undertaken numerous initiatives to promote export activity, many of which have been quite successful -- one estimate is that $1 of export promotion spending ultimately leads to $40-50 of export sales.[71] In addition, Canada's trade negotiators have achieved greater and more secure access to world markets through GATT negotiations and, more recently, through the negotiation of a free trade pact with the United States.

Ultimately, however, most firms have failed to take full advantage of the positive environment established by government. A 1989 Arthur Andersen survey of company intentions in light of the Canada-U.S. Free Trade Agreement found that only 38 percent of firms surveyed planned to "take a serious look at exporting to the U.S.," versus 46 percent who would consider importing from the United States.[72] Indeed, the absolute number of firms selling into export markets remains disappointingly small.

I) Shifting Policies Toward Foreign Investment

As discussed in Chapter 3, Canada's economic development has been strongly influenced by large inflows of foreign direct investment (FDI). Government policy toward FDI has historically oscillated between receptivity and caution. From the implementation of the National Policy through to the 1950s, foreign investment was welcomed, first as a natural consequence of Canada's colonial links to Great Britain (the predominant source of capital until the mid-1920s) and then as a way of funding economic growth in the post-war period.

The debate over FDI in Canada began in earnest in 1958 with the release of the Gordon Report, which recommended action to increase the influence of Canadians in the activities of foreign-owned subsidiaries. Throughout the 1960s, a number of specific industries were targeted as requiring measures to limit foreign control directly. These policies reflected the prevailing view that binding controls on FDI and on the actions of foreign-controlled firms were only necessary in selected industries.

In the early 1970s, however, attitudes toward foreign investment hardened. A government body, the Foreign Investment Review Agency (FIRA) was created specifically to review proposed foreign investments in Canada and to monitor the behaviour of existing foreign-controlled businesses. Established in 1973, FIRA had a mandate to screen all foreign investment in Canada, whether in the form of new businesses, direct acquisitions of existing Canadian businesses, or indirect acquisitions occasioned when the parent foreign firm was itself acquired by another foreign company. In considering whether to approve foreign investments, the agency applied a "significant benefit to Canada" test.

FIRA's impact is difficult to measure. Undoubtedly the agency created uncertainty and delays for prospective foreign investors, and probably deterred some investments. Overall, however, it does not appear to have had a major impact. Of the 6,599 investments reviewed by FIRA over the course of its existence (until 1985), only 435 were refused.[73] FIRA's most important role was as a general indicator of the government's -- and perhaps the Canadian public's -- attitude to foreign investment.

FIRA's mandate was narrowed in the early 1980s, and by 1984 the federal government decided to recast the agency as Investment Canada. Like its predecessor, Investment Canada is still involved in screening some foreign investments -- specifically, direct acquisitions if the assets are $5 million or more, as well as indirect acquisitions if assets are $50 million or more. Foreign investment in new businesses, however, is not subject to review. Special rules apply to sensitive sectors such as cultural industries (including publishing) and oil and gas. In contrast to FIRA, Investment Canada's primary function is to encourage new investment in Canada; it also seeks to facilitate efforts by small and medium-sized Canadian companies to establish links with foreign partners through joint ventures, technology licensing agreements, and other types of strategic alliances.

By 1992, under the terms of the Canada-U.S. Free Trade Agreement, reviews of investments made in Canada by American firms will be limited to transactions exceeding $150 million in the case of direct acquisitions of existing businesses. No reviews of indirect acquisitions by U.S. investors will take place after January 1, 1992. Again, exceptions are made for cultural industries, oil and gas, the uranium industry, and financial services.

Since its establishment, Investment Canada has turned down very few proposed foreign investments -- although it has secured commitments from foreign investors to modify their plans in order to increase the expected benefits accruing to Canadians. Overall, present Canadian government policy on foreign investment appears well aligned with the goal of avoiding restrictions on foreign investment.

ii) Export Promotion

Canadian governments at both the federal and provincial levels offer a myriad of programs and services designed to increase exports. Most of these programs are targeted at small and medium-sized companies.

Financial assistance: The Program for Export Market Development (PEMD), the federal government's primary trade promotion program, provides financial support (up to 50 percent of the costs) to help firms identify export markets, attend trade fairs and missions, prepare project bids or establish permanent sales offices abroad. This is further enhanced by provincial programs that offer similar kinds of financial support.

Foreign market intelligence and liaison: Canada's highly regarded Trade Commissioner Service (TCS) provides Canadian firms with information on foreign markets as well as potential agents, joint venture, or licensing candidates. It also attempts to match specific opportunities to qualified Canadian exports through the World Information Network (WIN) Exports databank, which contains detailed information on the capabilities of over 30,000 Canadian exporters.

Insurance and credit financing: The Export Development Corporation (EDC) provides Canadian firms both insurance against non-payment by foreign buyers, and mixed credit financing in support of competitive bids for foreign projects. In 1989, the EDC insured or guaranteed $4.5 billion in Canadian exports, involving more than 1,600 companies. In addition, $1.5 billion in export credits was provided, directly benefiting 94 exporters and some 3,900 of their suppliers. Overall, small and medium-sized businesses represent 80 percent of EDC's clients. Many provinces offer their own export loan guarantees as well. In its first year of operation, for example, Alberta's export loan guarantee program provided $200 million in guarantees to small and medium-sized Albertan firms.

Logistical support for firms unfamiliar with the mechanics of export selling: The Department of External Affairs provides several programs directed at new exporters. The New Exporters to Border States (NEBS), the New Exporters to the U.S. South (NEXUS), and the New Exporters to Overseas (NEXOS) programs take first-time exporters through the process of exporting to the U.S./Europe, and provide information on banking, insurance, agents and distributors.

In addition to these programs, the federal government has implemented a broader trade initiative known as the Going Global trade strategy, a five-year, $94 million program designed to expand Canada's export presence in the U.S., Europe and Asia/Pacific regions. Each province has its own series of programs designed primarily to enhance the export marketing capabilities of local firms. These programs vary in size, from New Brunswick's $500,000 Trade Assistance Program to Ontario's $60 million Export Support Program, but their common aim is to support the export activities of small and medium-sized firms.[74] Most provinces also maintain their own trade offices in foreign jurisdictions. The combination of federal and provincial trade promotion programs and trade offices abroad can cause confusion for prospective exporters and creates the impression of a highly fragmented national export promotion effort.

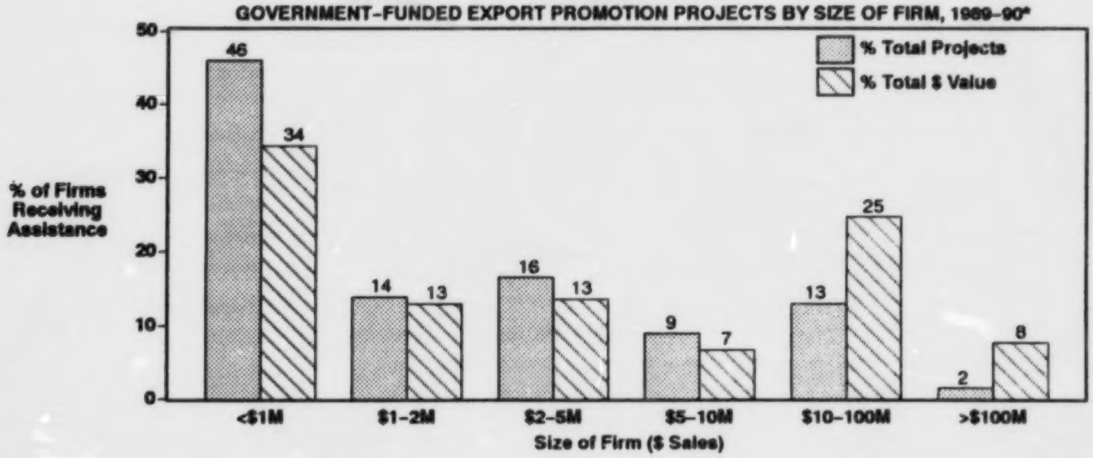
However, the 1990 IMD/World Economic Forum competitiveness report suggests that Canadian firms are well served by the various governmental programs: Canada ranked first among 23 countries on how well government officially promotes the activities of its companies abroad. Interviews with industry associations and exporters, as well as survey data, indicate that Canadian exporters are generally satisfied with the programs offered, that the programs are well utilized by exporting firms, and that they are appropriately targeted at small to medium-sized companies. And while there is some inconsistency in the delivery of export services (for example, depending on which foreign post is contacted), most firms felt they were well served. One industry spokesperson claimed that "there is a wealth of information out there on exporting, and I don't know if Canadian businesses can complain about a lack of available resources."[75] Others noted that the Trade Commissioner Service had "performed well," and that "its consulting-type work" -- whereby the TCS prepares in-depth background reports on foreign market opportunities by industry -- "has been a great help, and is much better than the U.S., which only produces simple, broad brush analyses."[76]

Two surveys conducted in 1990 suggest that firms make active use of government export assistance. Eighty-eight percent of companies surveyed in a Conference Board study, and 85 percent of small firms surveyed by the Institute for Research in Public Policy, stated that they had used government export support programs.[77]

As shown in Figure 9.13, Canada's primary export promotion efforts are targeted at small to medium-sized firms, which are most likely to need further incentives and assistance from government to move into international markets. In 1989-90, slightly more than one third of PEMD funds went to firms with sales of less than $1 million, while 25 percent were spent on mid-size firms with sales of $10-$100 million. These funds were spread quite evenly, with 34 percent serving the U.S. market, 27 percent targeted at Asia/Pacific, and 23 percent focused on European markets.[78] Thus, despite the importance of trade with the U.S., government export programs are actively encouraging Canadian firms to take a broader international outlook and to move beyond serving only the U.S. market.

Figure 9.13

GOVERNMENT-FUNDED EXPORT PROMOTION PROJECTS BY SIZE OF FIRM, 1989-90*



*Industry-initiated projects only
SOURCE: DEPARTMENT OF EXTERNAL AFFAIRS, INTERNAL PAPER

The federal government's ability to assist in fostering a more international outlook among Canadian firms has been hampered somewhat by funding reductions in key programs. For example, the PEMD program has seen funding reduced by approximately 8 percent per year, from roughly $47 million in 1984-85 to $32 million in 1989-90. At the same time, however, the program continues to allocate resources to almost every sector of the economy. There is little evidence that an effort has been made to establish linkages between export support and competitive clusters. While as many as 38 sectors received export support in 1989-90, some were allocated as little as $5,200 (accommodation, food and beverage) or $11,841 (Health and Social Service).[79] Excessive fragmentation is characteristic of government policies in a number of policy areas, and raises issues about the effectiveness of below-critical mass expenditures.

Few of the executives interviewed during the course of this study commented on inadequate export support from governments. Rather, the predominant view was that firms in Canada had not been aggressive enough in pursuing foreign markets. As discussed earlier, the ability and proclivity of firms to export is strongly affected by the interaction of all the determinants. Our industry studies confirmed the relatively weak state of many diamonds, thus, this lack of a well developed export position is not altogether surprising. Nevertheless, in an increasingly competitive world, a singular focus on serving the domestic (or even North American) market will not build Canada's long-term competitive advantage. As the Advisory Council on Adjustment stated in its 1989 report:

> The attitude of Canadian companies to exporting must change fundamentally if they are to take advantage of the opportunities offered by the new trading environment . . . Exporting is not well understood and less well implemented, despite the seminars and information put out by the government and private sector on how to be a successful exporter . . . Canadians must develop an export mentality that goes beyond the traditional exports of commodities . . . and beyond our traditional export markets.[80]

iii) Trade Policy

Canada's post-war trade policy has broadly and appropriately supported the goal of multilateral trade liberalization. The consistent trade policy objective of post-war governments has been to preserve and improve access for Canadian exports to foreign markets, particularly the U.S., and to diversify export opportunities for Canadian producers.[81] However, the reality is that Canada entered the post-World War II period with a highly protectionist set of trade barriers in place, in part a legacy of the National Policy.

History of Protection: In common with other countries, Canada has sought to protect sensitive domestic sectors -- including textiles, clothing, and much of agriculture -- through both high tariffs and non-tariff barriers such as subsidies, government procurement preferences for Canadian firms and a well developed anti-dumping regime.

Although the level of protection afforded to Canadian industry has generally declined, effective protection remains high in some sectors.[82] As a result of the GATT negotiations in the late 1960s and 1970s, Canadian tariffs have fallen to levels closer to those maintained by its major international competitors. Nevertheless, Canadian tariffs remained higher than those of most industrialized countries following the full phasing-in (by 1987) of tariff reductions agreed to during the Tokyo Round. Canada also imposes quantitative restrictions on imports of supply-managed agricultural commodities, textiles, clothing and a variety of other products placed on the Import Control List. Liberalization has occurred, but unevenly across sectors.

The Canada-U.S. Free Trade Agreement: The negotiations leading to the Canada-U.S. Free Trade Agreement (FTA) were undertaken at the initiative of the Canadian government, and represented a watershed for post-war Canadian trade policy. The FTA will eliminate all tariff barriers to trade between the two nations by 1999 (with a few exceptions, mainly in cultural industries and transportation). Most of the pre-FTA tariffs imposed by the U.S. on Canadian goods will be eliminated within five years (that is, by 1994), while most Canadian tariffs against U.S. products will be phased out within ten years. The FTA contains detailed rules of origin to determine eligibility for the elimination of tariffs. Like tariffs, all import and export quotas between Canada and the U.S. are also to be eliminated, unless they are permitted under the rules of the GATT.

The Agreement also:

- reduces the number, and lessens the trade-distorting impact, of non-tariff barriers to bilateral trade;
- establishes a framework to liberalize gradually cross-border trade in services, based on the core principles of national treatment, transparency, and right of establishment;
- liberalizes and limits restrictions on cross-border direct investment (in Canada's case, by raising the threshold for review of direct investments by American firms from $5 million to $150 million by 1992);
- sets forth new rules to manage disputes relating to trade remedy cases, and adopts a specific procedure to negotiate new rules in areas such as dumping and subsidies by 1995-96; and
- creates a Canada-U.S. Trade Commission to supervise the implementation of the agreement and to resolve disputes not falling under other, more specific dispute settlement mechanisms provided for in the agreement.

To a large extent, the FTA can be understood as a belated attempt by the two governments to "catch up" with the evolving business realities of closer cross-border trade and investment linkages across the border. It also represents a North American response to the evolving trends toward globalization of business and stronger regional trade arrangements. The agreement should not be expected to have a large impact on trade flows. The average tariff on dutiable industrial goods imported by Canada from the U.S. prior to the FTA was roughly ten percent, while that facing dutiable industrial goods exported from Canada to the U.S. was approximately six percent. For all traded goods, however, the average level of duty on Canadian imports and exports was 2.4 percent and 0.9 percent, respectively. These figures suggest that the FTA was a modest step toward liberalization of market access, not a leap into a vast, unknown territory.

Although the anticipated gains from the FTA have only begun to materialize, there can be no doubting its long-term benefit to Canadian industry and to the country's economy. Most economic studies assessing the impact of the FTA suggest that, over time, it will increase both industrial productivity and real incomes in Canada.[83] The security of access gained to the U.S. market -- as the final resolution of the pork dispute in 1991 demonstrated -- has reduced the threat of arbitrary U.S. trade restrictions being imposed on Canadian products. More importantly, and often overlooked, the FTA will foster greater competition in the Canadian domestic market. Though this will accelerate a sometimes painful restructuring in some sectors, virtually all evidence from past trade liberalizations indicates that heightened competition in the domestic market will lead to more efficient and innovative companies operating in Canada.[84] In sum, the FTA represents a critical step forward in establishing a domestic environment conducive to achieving long-term international competitiveness.

B. Policies Affecting Goals of Individuals and Firms

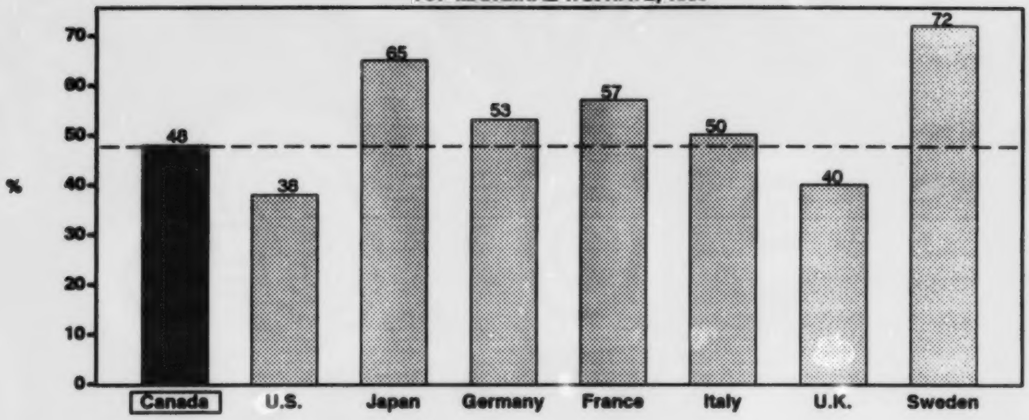
The goals of firms and individuals are strongly influenced by tax policy, particularly as it encourages or discourages long-term investment in human and capital assets and provides incentives for additional effort.

i) Incentives for Individuals

The most important tax policies in terms of providing individual incentives are in the areas of income and capital gains tax.

Personal Income Tax: Canada's tax reform initiatives accomplished the broad objectives of lowering tax rates and broadening the personal tax base -- steps that were in line with world-wide trends during the 1980s. As shown in Figure 9.14, Canada's top personal income tax rates as of 1989 were lower than those in Japan and most European countries (rates in Canada have risen slightly since 1989). Some higher tax countries, however, are continuing to lower personal income tax rates. The government of Sweden, for example, recently unveiled a reform proposal that will slash the top tax rate from more than 70 percent to 51 percent -- roughly equivalent to current top rates in Canada.[85] The U.S., however, has significantly lower personal income tax rates than Canada. Given the geographic proximity, cultural similarities and the ease of labour mobility between the two countries, U.S. tax rates are an important benchmark.

Figure 9.14
TOP MARGINAL TAX RATE, 1989



SOURCE: OECD ECONOMIC SURVEY, 1990

While a straightforward comparison of federal rates shows little dissimilarity in Canadian and U.S. marginal tax rates, particularly among higher income groups (29 percent in Canada vs. 28 percent in the U.S.), much higher provincial taxes and surtaxes in Canada result in significantly wider differences. In the U.S., eight states do not even have state income tax, and those that do generally impose substantially lower rates than Canadian provinces. The top, all-in marginal tax rates in Ontario and Quebec are roughly 50 percent, while the corresponding rates for California and New York are slightly more than 35 percent -- that is, almost 30 percent lower than in Canada.86 For lower income Canadians, the tax gap with the U.S. is smaller.

Marginal tax rates, however, do not capture all the personal income tax differences between the countries. Other taxes -- for example, sales taxes and real estate tax -- as well as available tax deductions should also be included in any comprehensive comparison of Canada-U.S. taxes. A recent Price Waterhouse study attempted to assess all these factors in comparing the two country's tax burdens. It found that "when favourable personal deductions are brought into the picture, the tax gap between the two countries widens dramatically."87 Figure 9.15 shows that effective taxes for "typical" mid- to high-income earners are much higher in Canada than the United States. The study concludes that "Canadians, particularly higher-income Canadians, face far higher taxes than do Americans."88

It must also be noted that high tax rates in Canada are partially offset by extensive social benefits, particularly government-funded health care, although these benefits are relatively less significant for higher-income persons who could easily afford high quality private health insurance coverage.

Figure 9.15
AFTER-TAX INCOME, SELECTED CITIES, 1990

ANNUAL SALARY LOCATION	US$60,000*	US$100,000**
New York	$39,585	$85,092
Toronto	$39,022	$61,729
Chicago	$41,557	$83,590
Montreal	$36,817	$56,575
Houston	$48,220	$78,664
Calgary	$39,189	$62,277

*** Assumes single person, living in rented accommodation; before housing and living expenses**

**** Assumes a married homeowner, with two children; before housing and living expenses**

SOURCE: ROBERT BROWN, PRICE WATERHOUSE

Canadian personal income tax rates are certainly not unusually high by European standards, and such relative tax differentials exist in Europe as well. Moreover, because labour is less mobile than capital, income taxation arguably has only a modest effect on individual locational decisions. However, the interconnectedness of the Canadian and American economies, combined with the two nations' cultural similarities and Canadians' acute awareness of opportunities in the U.S., means that the issue of income tax differentials must be a source of some concern for Canada. A much higher tax burden in Canada relative to America may affect the willingness of some Canadians to work as long or as hard as their American counterparts, since a bigger proportion of the earnings derived from their efforts accrues to the state.

The Canada-U.S. tax differential already plays a role in attracting thousands of highly-skilled and well-educated Canadians to the U.S. each year. The emigration of such individuals represents a loss to the Canadian economy. Migration of skilled and well-educated groups could become a growing problem for Canada in the future as skilled workers everywhere become more mobile and a nascent global market for executive personnel emerges.[89] Skilled human resources will be attracted to the location with the most favourable national diamond, because it provides greater opportunity, of which the tax structure is but one dimension.

Concern over executive/professional mobility was voiced by senior executives in industries such as life insurance, who have found it increasingly difficult to lure senior managers back to Canada once they have been posted to the United States. The same problem faces manufacturing firms such as Northern Telecom, which have extensive operations in both countries.

Capital Gains Tax Incentives: High and sustained rates of capital investment are encouraged through favourable tax treatment of capital gains, notably on equity investment in firms. Attractive capital gains tax incentives encourage investment in public markets and expand the pool of capital available for companies. While Canada's tax treatment of capital gains is not as generous as that of other nations -- Italy and Switzerland do not tax capital gains on equity investments at all, while Sweden taxes long-term gains at a flat rate far below the top marginal tax rate -- Canada's lifetime $100,000 exemption and 75 percent inclusion rule do provide a valuable investment incentive. Canada also provides incentives for investment in small businesses through the $500,000 capital gains exemption (see Figure 9.16). In Canada-U.S. tax comparisons, these favourable capital gains tax rules partially offset Canada's less advantageous personal income tax regime. Nevertheless, active Canadian investors who have utilized their $100,000 lifetime capital gains exemption face an effective capital gains tax as high or higher than investors in the U.S. because of Canada's substantially higher marginal tax rates.

Figure 9.16

CAPITAL GAINS TAX TREATMENT

COUNTRY	TREATMENT	SPECIAL PROVISION
Italy	• Capital gains - tax free, unless derived from "speculation" (real estate, art)	• None
Switzerland	• Capital gains tax free	• Sales of real estate subject to 10% cantonal tax
Sweden	• 100% of capital gains are included as net income, taxed at flat rate of 30%	• None
Canada	• 75% of capital gains included as net income, taxed at appropriate marginal rate	• $100,000 lifetime capital gains exemption • $500,000 lifetime capital gains exemption for qualified small businesses • Losses on sale of small business shares deductible
Germany	• Long-term capital gains - tax free (land/buildings, 2 years; securities, six months) • Short term gains included as net income, taxed at marginal rate	• None
U.K.	• 100% included as net income, taxed at marginal rate;	• Allowances for inflation • Asset exemptions
Japan	• Capital gains included in net income, but taxable gain reduced by 50% if sold assets held at least 5 years	• Statutory $500,000 deduction
U.S.	• 100% of capital gains included as net income, taxed at appropriate marginal rate	• None

SOURCE: DEPARTMENT OF FINANCE, INTERNAL PAPERS ON COMPARATIVE CAPITAL GAINS TAX RATES, 1991, MONITOR COMPANY ANALYSIS

Neither the U.S. nor Canada makes a distinction, for tax purposes, between long-term and short-term capital gains. In some industrialized countries -- notably Germany and Japan -- short-term gains are taxed more heavily in order to encourage investors to adopt a longer time frame when making investment decisions. Tax rules designed to foster a longer term view on the part of investors would encourage efforts by a nation's companies to build longer term competitive advantage, and lessen managers' preoccupation with short-term results. Such tax rules are an important tool for governments to spur new business formation, the growth of existing businesses and the development of competitive industries.

ii) Policies Affecting the Goals of Firms

Company goals are also influenced by government policy, most obviously by policies in the areas of corporate income tax and incentives for investment in R&D.

Corporate Taxation: Federal tax reform in 1987 brought about significant changes in Canada's corporate tax system. The basic federal corporate tax rate was reduced from 36 to 28 percent, while the tax base was broadened by reducing incentives for certain classes of investment and scaling back capital cost allowances. Figure 9.17 outlines the rationale for the changes and the major actions taken. Analyses by the Department of Finance (utilizing the marginal rate method) and by the Conference Board of Canada (utilizing a discounted cash flow model) suggest that corporate tax rates in Canada and the U.S. are very similar, once the effects of the relevant provincial and state taxes are factored into the analysis. However, a recent study by Grady shows that while Canada once enjoyed a slight advantage vis-à-vis the U.S. in terms of the tax treatment of manufacturing investment, this advantage has largely disappeared as a result of less generous depreciation write-offs under recent Canadian tax reforms.[90] Attempting to maintain a rough balance in the corporate tax burden between the two countries must be a policy goal of Canadian governments because of the high degree of capital mobility across the border. This has become even more important in the environment created by the Canada-U.S. Free Trade Agreement.

Figure 9.17

CORPORATE TAX REFORM: GUIDELINES AND MAJOR ACTIONS (1987)

Tax Reform Was Guided by the Following Considerations

- To provide firms with incentives to invest in profitable ventures by lowering marginal tax rates
- To reduce the influence of the tax system on the allocation and financing of investment, by reducing the dispersion of tax rates between activities, types of capital, and the mode of financing it (that is, minimize government interference with the efficient operation of markets)

Selected Major Actions

- Reduction of federal rate from 36 to 28 percent although three percent surtax on all corporations' incomes still remains
- Continue to favour manufacturing & processing sector to maintain the relative tax position of the tradeable goods sector, although M&P tax deduction reduced from six to five percent
- Continue to favour small corporate business with a 12 percent rate on the first $200,000 of income for Canadian-controlled private corporations
- Elimination of the general investment tax credit, which had seriously depleted the tax collected, distorted the free market flow of funds, and negatively impacted the incentives for firms to innovate and upgrade
- Maintain the R&D investment tax credit
- Maintain investment tax credits for regionally depressed areas
- Change in depreciation rates for class 29 manufacturing & processing equipment from three-year write off to 25 percent declining balance
- Replacement of FST with GST

SOURCE: GOVERNMENT WHITE PAPERS ON TAX REFORM; C.D. HOWE INSTITUTE, TAX REFORM PERSPECTIVES ON THE WHITE PAPER; OECD ECONOMIC OUTLOOK, 1990; INTERVIEWS WITH FINANCE DEPARTMENT OFFICIALS

Research and Development Tax Incentives: Studies have consistently shown that Canada has among the world's most generous research and development tax incentive programs. It has long been government policy to support R&D in Canada, and the policies in place at both federal and provincial levels reflect this objective.

A 1990 study by the Conference Board of Canada utilized the "B" index to assess the competitiveness of Canada's tax system as it relates to R&D investment.[91] (The "B" index defines the minimum benefit/cost ratio at which an R&D investment becomes profitable.) The study found that Canada's tax treatment of R&D conducted by large manufacturing companies was the most favourable among the eight major industrialized countries examined (see Figure 9.18).

Figure 9.18

RANKING OF "B" INDEXES, SELECTED COUNTRIES, 1989 VS. 1981

COUNTRY	1989	1981
Canada	1	1
Korea	2	6
U.S.	3	2
U.K.	4	5
Japan	5	4
Germany	6	8
Italy	7	7
Sweden	8	2

SOURCE: CONFERENCE BOARD OF CANADA *INTERNATIONAL COMPETITIVENESS OF CANADIAN R&D TAX INCENTIVES: AN UPDATE*, 1990

It is important to note that in Canada a combination of both federal and provincial taxes and incentives determines R&D investment attractiveness. For example, Quebec's low provincial corporate income tax rate (by far the lowest in Canada), coupled with additional incentives such as its refundable tax credit for 20 percent of R&D wages, make Quebec a more attractive location for R&D than other provinces.

There are several major federal incentives for research and development. These include the 100 percent deductibility for capital expenditures on R&D machinery and equipment, and a federal tax credit of 20 percent (30 percent in Atlantic Canada) on qualifying R&D expenditures. Although the rules are generous, some industry executives interviewed remarked that the administrative burden associated with obtaining Canadian R&D tax credits was high and sometimes deterred companies from investing in R&D. In response to this concern, the federal government announced in its February 1991 budget that it will examine whether modifications of the R&D Tax Credit may be needed to reduce the associated administrative complexity for firms. Overall, Canadian R&D tax rules provide Canadian corporations with a significant cost advantage over U.S. firms.

Despite these generous tax incentives, Canadian private sector R&D levels remain low. While Canadian governments have created a positive tax environment for R&D, firms are not taking advantage of these incentives. This reflects other aspects of the Canadian diamond that influence the pressure to innovate and its expected profitability, such as the supply of skills, access to home-based suppliers and domestic rivalry.

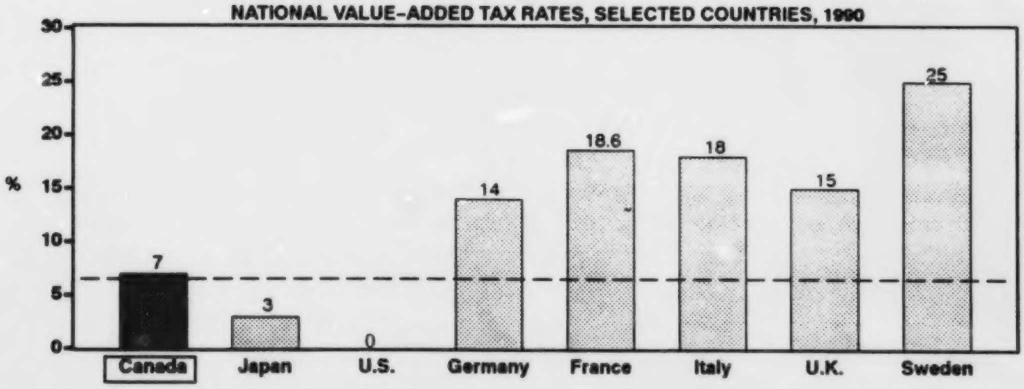
Sales Taxation and the Goods and Services Tax (GST): The implementation of "Phase Two" of federal tax reform -- the replacement of the Federal Sales Tax (FST) with the GST -- is generally agreed to have improved the competitiveness of Canada's tax system, particularly from the perspective of businesses that manufacture in Canada and/or export from Canada. The shortcomings of the FST had long made its replacement a necessity. The FST was applied to the manufacturer's sale price of domestically produced goods as well as to imports, including duty. Since many manufactured goods were subsequently sold to downstream businesses, the taxes would "cascade" as inputs were transformed and sold again. Estimates are that nearly half the FST collected was paid on inputs to Canadian manufactured goods. As there was no specific tax rebate on exports, then, the FST hurt the cost position of exporters by raising input prices for Canadian businesses. The FST also had a bias in favour of imports: they were subject to lower effective tax rates (on average 30 percent less) than comparable domestic goods, since distribution and marketing costs of imported goods were not included in the tax base.

The GST will relieve most of the substantive problems. A broadly-based consumption tax, the GST encompasses almost all goods and services, which it taxes at the same valuation level. From a corporate standpoint, the GST is a value-added tax and is passed on to the ultimate consumer. Companies are reimbursed through the business input tax credit, thereby relieving indirect taxation of inputs. In addition, imports are now taxed at the same valuation level as domestic goods. Since no GST is paid on exports, the longstanding bias against exports and in favour of imports has been removed.

At seven percent, the federal GST places Canada at the low end of those countries with a national value-added-type tax. However, all Canadian provinces except Alberta have their own retail sales taxes, which vary from six percent in British Columbia to 12 percent in Newfoundland. Including these provincial taxes brings Canada's total value-added tax burden to the 13-15 percent range for most provinces -- which puts Canada in line with most G7 competitors. The notable and important exception is the U.S., the only major industrialized country without a national sales tax (see Figure 9.19).

Figure 9.19

NATIONAL VALUE-ADDED TAX RATES, SELECTED COUNTRIES, 1990



SOURCE: OECD ECONOMIC SURVEY, 1990

C. Policies Affecting Domestic Rivalry

Domestic rivalry is most keenly influenced by national competition laws, the extent of regulation in the economy, and by policies that foster new business creation.

i) Competition Policy

Few roles of government are more important to the upgrading of an economy than ensuring vigorous domestic rivalry. A strong competition policy, especially in the areas of horizontal mergers and collusive behaviour, is essential to dynamism. Until recently, Canada's competition legislation was ineffective in fostering domestic rivalry. Moreover, the laws that were on the books were either unenforceable, rendered meaningless by judicial decisions, or simply not a substantial deterrent to anti-competitive business behaviour.

Historically Weak Competition Laws: Canada's anti-combines legislation, passed in 1889, actually predates U.S. anti-trust law by one year. From its inception, however, it never provided the sanctions available under American law. Some would argue that this was because the framers of Canada's original anti-combines legislation did not share American views concerning the importance of vigorous competition in enhancing consumer welfare. One study, for example, noted that "the framers of Canada's early legislation were not hostile to big business in general; indeed, they believed that the nation as a whole stood to benefit from large aggregations of capital."[92] Canadians viewed "larger organizations as a defensive necessity, as a sole means of capturing vital scale economies in a geographically huge country with a sparse population tenuously linked."[93] In contrast, in the U.S. a marked revulsion against concentration of power and large-scale control led to some of the strongest anti-trust legislation in the world.[94]

Several authors have also observed that, in part due to the country's attitude to authority, Canada's competition laws were less stringent than those in United States. As Dunlop, McQueen and Trebilcock state:

> Devotion to the philosophical idea of competitive free enterprise, or to the inherent virtue of small business enterprise as contrasted with large seems to have been weaker in Canada than in the U.S., both among businessmen and the public at large. It was treated as perhaps attractive in theory, but . . . above all, Canadians seem to have had a more deferential attitude toward authority in general. This difference extended to authority wielded by large business enterprises, authority frequently existing with the aid and approval of governments.[95]

This attitude contrasts with the U.S., where a grass roots populist campaign against establishment power preceded the adoption of anti-trust laws.

Canada's anti-trust environment was further hampered by the burden of proof required of government prosecutors when they attempted to obtain convictions. Under the Anti-Combines Act (1923), violations of the monopoly and merger laws were classed as criminal offenses; to obtain a conviction, therefore, required proof beyond a reasonable doubt that competition had been lessened "unduly," and to the detriment of the public. Not only was enforcement of the law rendered difficult by the higher standard of proof required, the word "unduly" gave judges considerable leeway in interpreting the consequences of purportedly criminal acts. Given that British common law was lenient in the area of restraint of trade, a weakness of the British economy, this typically led the courts to take a very tolerant view of anti-competitive behaviour.

Predictably, the enforcement results in the critical areas of mergers and monopolies were not impressive. From 1889 to 1986, the Crown was able to successfully prosecute only one monopoly case and no merger cases, although a larger number of conspiracy and bid-rigging convictions were obtained. This contributed to the high concentration levels seen in many industries.

Recent Reforms: Substantive reform of the competition policy was not completed until 1986. The changes made have strengthened Canadian competition law in several areas. Reforms affecting the legislation itself, the adjudication process, and the role of the Competition Bureau in examining mergers together created a regime that provides tougher enforcement against anti-competitive behaviour among Canadian-based firms.

Earlier reforms to the law -- the so-called "Stage One" amendments of 1976 -- improved the scope of the legislation by adding the service sector, which had been excluded from the Anti-Combines Act. Bid-rigging was made a *per se* criminal offense, as it presently is in the United States. The Director of Investigation and Research of the Competition Bureau was also empowered to make representations to regulatory bodies in respect of the maintenance of competition. This power, which has been frequently utilized, assists in raising awareness among regulators and citizens of the importance of assuring healthy competition in the Canadian marketplace.

The new Competition Act of 1986 ushered in the most important changes to competition policy. Fundamental improvements were made in several areas:

- The Competition Tribunal was established to serve as a quasi-judicial body that presides over civil reviewable cases. Its effectiveness has been strengthened by the presence of lay experts, who adjudicate with judges and help to ensure that sufficient consideration is given to economic analysis in rendering decisions.

- Monopolization (abuse of dominance) provisions are no longer treated as criminal offenses; they are now adjudicated as civil reviewable practices. This decriminalization lowers the threshold of proof required of the Competition Bureau, which increases the likelihood of achieving successful remedial orders. The Bureau successfully prosecuted its first abuse of dominance case (Nutrasweet) in 1990, the last successful prosecution of unfair competition having been in 1951.[96]

- A formalized merger review process has been introduced to ensure that all mergers are now evaluated against a potential anticompetitive threat. Mergers have also become civil reviewable practices, thus enabling the Tribunal to block or dissolve a merger that lessens, or would likely lessen, competition substantially. In fact, the Bureau has examined over 880 mergers since June, 1986, and has either received undertakings to make modifications or is actively monitoring approximately eight percent of those cases; this contrasts with no monitoring or modifying of any merger activity prior to the 1986 Act.[97]

- In line with anti-trust practices in the U.S. and selected European countries, the Competition Bureau recently published Merger Enforcement Guidelines. These provide a comprehensive outline of how the Bureau conducts merger analysis, increasing understanding and accountability of the provisions. They broadly mirror and improve upon the analytical approach followed in the U.S., which is important given the increasing integration of the North American market.

- Though still not providing as clear-cut a test as the *per se* illegality rule for price fixing/cartels used in the U.S., the Competition Act clarified Canada's conspiracy laws. This has allowed for greater leeway in prosecuting anticompetitive behaviour, although recent challenges to the conspiracy section will likely require adjudication by the Supreme Court of Canada. If necessary, however, legislative amendments to the Act could be introduced.

The Efficiency Exception: Given the importance of maintaining vigorous domestic rivalry, the efficiency exception provision in the 1986 Competition Act is a cause for concern. The Act recognizes that "encouraging competition" and "promoting the efficiency of the Canadian economy" may not be mutually compatible. Indeed, the Act acknowledges that "some mergers may be both anticompetitive and efficiency enhancing."[98] The efficiency gains provision of the Act was created to resolve this conflict, and "explicitly . . . (does so) in favour of efficiency."[99]

This potential weakening of competition law could have a negative impact on domestic rivalry in Canada, especially if it were used broadly to permit mergers among industry leaders. Innovation and dynamism are far more important than static efficiency in determining economic welfare. The need to heavily weight these elements is a major implication of our theory.

Under the Act, the standard of proof required to convincingly demonstrate efficiency gains is high. There are several tests that must be met -- including, for example, that the efficiency gains brought about by a merger are demonstrably greater than, and offset any substantial lessening of, the benefits of competition, and that they are quantifiable. The record to date suggests that this standard is indeed difficult to meet: the efficiency gains defence has been invoked in approximately 100 horizontal mergers, yet only once has it been deemed sufficiently persuasive to overturn a decision that otherwise would have required a finding of a substantial lessening of competition.[100]

Overall, the 1986 Competition Act significantly and appropriately strengthens the federal government's ability to enforce more vigorous domestic competition. In most respects, Canada's laws now meet the standards set by U.S. anti-trust laws, which are the strongest in the world. In contrast, a number of other industrialized nations, including Sweden and Italy, have had very weak competition laws. Until 1990, Italy did not even have a competition law, while in Sweden "the deterrent effect of policy has been much less than in the U.S., since in most cases no penalties are imposed on firms that are found guilty of restraints of trade . . . (In fact) the Competition Commissioner has allowed almost all mergers to proceed in Sweden, with the consequence that the merger law is regarded as an empty threat."[101] In Italy, as in Japan, a large number of rivals ensured vigorous rivalry in most of the important export industries.[102] In Sweden, nearly all of the successful exporting industries have a history of domestic rivalry, and excessive consolidation threatens dynamism in the Swedish economy.[103]

Italy has enacted new competition laws. In addition, Japan and Sweden have recently announced proposals to toughen their country's weaker competition laws. In July, 1991, Swedish anti-trust authorities for the first time blocked a merger between domestic competitors.

ii) Deregulation and Privatization

Consistent with a competition-enhancing anti-trust policy is the removal of government-imposed restrictions on domestic competition. Regulation of competition usually militates against the upgrading of competitive advantage in an economy, for it stifles innovation and makes the regulated industry a less desirable buyer and supplier. In fact, the ten-nation study revealed that the nation in which competition is least regulated frequently possesses international leaders in the relevant industry. Thus, "deregulation of competition and privatization of state monopolies are usually spurs to national advantage."[104]

Deregulation: Following an exhaustive review of federal programs and regulations, the Nielsen Task Force on Program Review (1985) concluded that Canada was both "over regulated and badly regulated," an assessment we share. The task force pointed to a significant overlap between layers of government in administering regulations, and to extensive barriers to interprovincial trade caused by government regulations. It estimated that the cumulative burden of all governmental regulations on the economy represented a "60 billion dollar cost to Canada."[105]

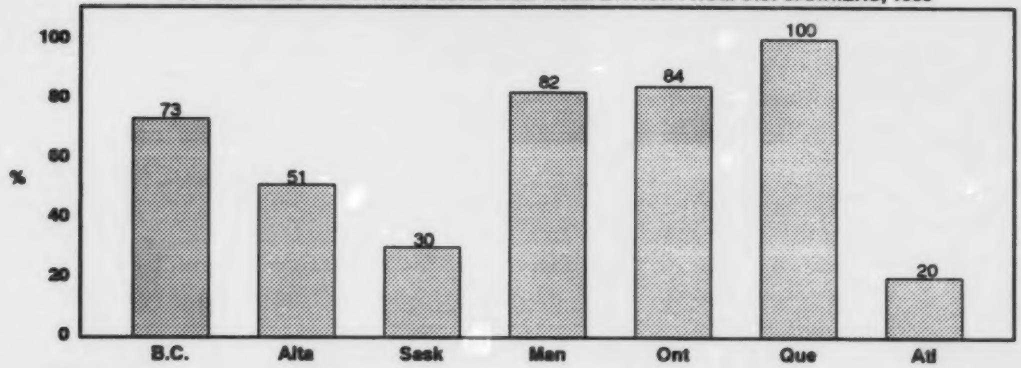
The federal government has been slow to respond to many of the task force's proposals, although positive steps have been taken. The government's "Regulate Smarter" policy has been well received by business groups. The principal goal of the policy is to limit the overall rate of proliferation of new regulations. In the area of economic regulation, new regulation is to be imposed "only where acceptable, non-regulatory alternatives are not available."[106] After evaluating the government's efforts to reduce the regulatory burden, the Canadian Manufacturers' Association concluded that the policy, "in effect since 1986, has worked."[107] The decrease in the volume of regulations passed since 1985 has been impressive -- from over 1,100 in 1985 to 568 by 1989. It is important that this positive momentum be continued.

The government has also taken positive steps to deregulate important sectors of the economy, thereby increasing competition in the domestic market. Energy markets and prices have been deregulated. Substantial deregulation of the transportation sector has also taken place. Changes in both federal and provincial legislation governing financial institutions have, on the whole, increased the extent of competition in Canadian markets for financial services. Telecommunications, however, has yet to experience significant deregulation.

One example of the positive impact of deregulation on the competitiveness of the Canadian economy is in the area of ground transportation, which was briefly discussed in Chapter 6. The 1988 Motor Vehicle Transport Act established a new national framework for the regulation of extra-provincial trucking. The legislation eased entry regulations for new and existing carriers and discontinued rate controls on Canadian routes. The government is also considering giving foreign carriers cabotage rights (that is, allowing foreign carriers to haul from one Canadian city to another). The results have been striking, and are particularly important to achieving improved competitiveness in Canada given the infrastructure disadvantages discussed in Chapter 6. For example, the National Transportation Agency received more than 8,700 trucking license applications in 1990, 1,700 of these from U.S. firms.[108] In addition, as noted in one recent report, "since the rules changed in 1982, it has been easy entry, cheaper rates for consumers, and cutthroat competition."[109] Revealingly, while the cost of hauling 20 tonnes of grain from Toronto to Winnipeg was $2,250 in 1987, by 1989 it had dropped to $1,950 -- a decline of 13 percent in nominal dollars, and more than 20 percent in real terms.

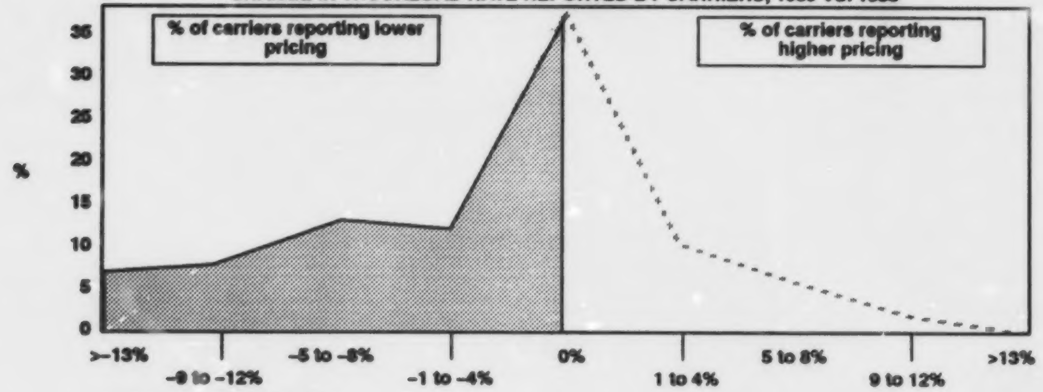
Figures 9.20 and 9.21 summarize some of the other impacts of trucking deregulation. It has increased the number of competitors in the industry, while reducing prices for consumers. Not surprisingly, many carriers in the industry are suffering from the stronger competition sparked by deregulation and are clamouring for government action to address their competitive problems. Canadian truckers do face some disadvantages vis-à-vis their U.S. competitors, including higher Canadian fuel taxes and less generous depreciation rules.

Figure 9.20
EASING OF ENTRY REGULATIONS
% OF CARRIERS INDICATING INCREASED COMPETITION FROM U.S. CARRIERS, 1989



SOURCE: NTA REVIEW, 1989

Figure 9.21
DISCONTINUANCE OF RATE CONTROLS
CHANGE IN TRUCKLOAD RATE REPORTED BY CARRIERS, 1989 VS. 1988



SOURCE: NTA REVIEW, 1989

The deregulation initiatives in recent years signal that the federal government recognizes the benefits flowing from greater competition in the home market. Not all provinces, however, are as enthusiastic about the move toward deregulation. Ontario, for example, recently announced a two-year moratorium on new licenses for truckers seeking to operate in Ontario. Freight brokers (intermediaries between carriers and their customers) will have to post a bond in order to conduct business.[110] By lessening competition in the Ontario trucking industry, this policy could raise shipping costs for Ontario manufacturers and resource producers, and thus put them at a competitive disadvantage vis-à-vis producers in other provinces as well as in the United States.

Privatization of Crown Corporations: In conjunction with deregulation initiatives, the federal government has taken steps to privatize selected Crown Corporations. Privatization works to raise productivity and innovation. Since 1986, the federal government has pursued a policy of selling off Crown Corporations and other Crown holdings that no longer fulfill a public policy purpose. To date, the government has sold in whole or in part its ownership of, or financial interest in, 19 companies (the most recent being the partial privatization of Petro Canada). Proceeds from these privatizations and asset disposals have netted the government approximately $1.4 billion.[111]

Many of these firms had operated, and still operate, in competitive markets. The return of Air Canada, Canadair, Fishery Products International, and Canadian Arsenals to the private sector removes the potentially distorting influence of government public policy priorities on firm strategies. With the exception of Petro Canada (already partially privatized), Canadian National, and a few others, many of the largest remaining federal Crown Corporations by 1991 operated in non-competitive sectors of the economy.

Provincial governments have acted more slowly in privatizing Crown Corporations that operate in competitive markets. The production of hydroelectric power remains under government control in most provinces, though there have been recent moves to place other resource-sensitive industries in private hands. For example, approximately two-thirds of the Potash Corporation of Saskatchewan is now owned by the private sector. In the telecommunications sector, Alberta has initiated privatization of the Alberta Government Telephone Company.

Interprovincial Trade Barriers: As noted earlier, interprovincial trade barriers limit the extent and intensity of rivalry in Canada. A wide array of both federal and provincial policies designed to foster local economic development have the effect of constraining competition. Preliminary steps to rectify this problem have been taken in two areas: government procurement and regulation of the brewing industry. Tentative agreements have been reached in both areas, but offer only partial solutions. For example, procurement agreements among the western provinces, as well as among the maritime provinces, provide for more open competition in the awarding of government contracts. As discussed earlier, a more far-reaching agreement on government procurement has been reached between the federal and provincial governments.

An initial agreement to open up Canada's brewing industry was reached in the fall of 1990, in response to complaints about Canadian practices made to GATT by Canada's major trading partners. It committed provincial governments to end discriminatory listing and pricing practices by the end of 1995. However, a firm deadline on reconfiguring provincial distribution systems was not set, thus casting doubt on the agreement's ultimate success given a long history of fierce provincial opposition to change in this area.

The fact that only limited progress has been made in addressing interprovincial trade barriers is worrisome. These barriers remain a significant impediment to improving domestic rivalry. While the federal government has been active in promoting a reduction in these barriers, the provinces must assume greater responsibility for moving ahead in critical areas such as procurement and mobility restrictions.

iii) Policies Affecting New Business Formation

Creation of new businesses and growth of existing small businesses help to foster an economic environment characterized by healthy competition. Government policies should encourage entrepreneurial activity and a positive attitude toward risk taking. They should also enhance capital access and availability, primarily through incentives which ensure that market tests, not political ones, are applied in evaluating individual projects. Finally, the regulatory process for establishing a new business should be as straightforward and streamlined as possible.

Encouraging Entrepreneurship: The Canadian government has historically made few attempts to promote risk taking and entrepreneurship. Fostering an entrepreneurial culture has traditionally not been seen as a government priority, or even as an appropriate concern of government. Although some tax incentives were introduced to direct venture capital to small and medium-sized enterprises, these were generally ineffective.

The federal government has recently taken steps to increase awareness of entrepreneurship and of its importance to Canada's international competitiveness. The National Policy on Entrepreneurship, announced in late 1988, included several measures:

- The creation of the National Entrepreneurship Development Institute, a not-for-profit organization charged with developing an entrepreneurship curriculum to be taught across the country. It is also to serve as a clearing house for information about entrepreneurship.

- The continued promotion of successful entrepreneurs through the Canada Awards for Business Excellence, which highlights the successes of emerging Canadian firms in areas such as innovation and new technology.

- The Entrepreneurship Awareness Program, which offers contributions to non-profit organizations that promote entrepreneurship.

While these are positive initiatives, their impact on Canada's business culture, as well as on the competitive advantage of Canadian industry, is likely to be modest. Developing a more entrepreneurial culture in Canada will be a long-term process, one that requires a change in prevailing Canadian views toward risk and the attendant rewards.

Enhancing Access to Capital: As discussed in Chapter 6, governments at the provincial and federal level play an active role in providing capital to small and medium-sized enterprises. This can only partially redress the fact that for many smaller firms, particularly in high technology fields, access to capital from traditional sources remains elusive. This continues to constrain the ability of these firms to upgrade their own technologies or to more aggressively target export markets.

5. SUMMARY

The relative weakness of both internal and external pressures on Canadian business has created a traditionally comfortable domestic market for Canadian firms and dulled incentives to pursue outward-oriented strategies. Historically high tariffs, interprovincial barriers, weak competition policy, and traditionally heavy government involvement in markets through regulation and state-owned enterprises have contributed to high levels of industry concentration and inhibited vigorous domestic rivalry in many sectors of the economy.

This insular focus has created a situation in which a limited number of firms, many of whom pursue cost-based strategies premised on exploiting basic factor advantages, account for much of Canada's exports. Small and medium-sized businesses in Canada tend to be focused on the domestic market and have little exposure even to the U.S. market. A domestic focus is not surprising given the relatively strong profits firms have enjoyed in the Canadian market. Companies have had incentives to grow through expanded participation in the attractive Canadian market, through increased horizontal and vertical participation, and through conglomeration.

Historically, many government policies have had an adverse impact on the context for firm strategy, structure and rivalry in Canada. High tariffs, weak anti-trust laws and enforcement, and heavy government intervention in the economy have all reinforced insularity by minimizing pressures on, and sometimes limiting opportunities for, Canadian firms.

Government policies in many areas bearing on this determinant, however, are moving in a positive direction, particularly at the federal level. These developments are encouraging, and must be built upon. A more open trade policy, a stronger competition policy, deregulation, and privatization of many commercially active, government-owned corporations will all help to make the Canadian environment more competitive. In other areas, particularly those affecting individual incentives such as tax policy and the structure of the social safety net, some positive changes have also taken place. However, in part because of Canada's proximity to the U.S., Canadians will need to monitor these issues carefully in the future to ensure that appropriate incentives are in place for individuals to work, invest and upgrade skills. Finally, the lack of a strong international orientation on the part of much of Canadian business remains an area of concern, but here primary responsibility must rest with business managers and employees themselves, not governments.

PART IV

SYNTHESIS AND CONCLUSIONS

CHAPTER 10

CHALLENGES TO CANADIAN PROSPERITY

Having examined the determinants of national advantage in Canada, we now return to overarching themes in the Canadian economy. We begin by revisiting the old economic order, first introduced in Chapter 5, and some of its consequences. We are now in a better position to place government's overall role in context. We then summarize the external forces that are already beginning to dismantle the old order. In responding to the external forces, Canadian industry confronts systemic barriers to upgrading that can be synthesized from previous chapters. Finally, we assess the nature and adequacy of changes presently underway in Canada to address the new competitive realities.

1. THE COMFORTABLE INSULARITY OF THE OLD ORDER

The preceding chapters present a picture of an economic system that served Canada well in many respects in the past, but leaves the economy ill-equipped for the future. This old economic order was an internally consistent system in which the determinants were mutually consistent and reinforcing. This will serve to make change more difficult.

Canada's abundant factor resources have been the bedrock of the economy. In many cases, these resources allowed Canadian firms to be profitable by exporting relatively unprocessed commodities rather than upgrading. Strategies based on basic factor advantages and often weak domestic competition limited the demand for advanced technology. This in turn constrained investment in R&D and demand for highly skilled employees, which was reflected in enrollment patterns in universities and in the nature of educational programs. The virtual absence of leading-edge related and supporting industries inhibited another possible source of technology. Furthermore, interprovincial barriers served both to lessen domestic demand and decrease the degree of rivalry.

These tendencies spilled over into other sectors of the economy where Canada did not have such advantages. Many other firms, insulated from external and internal rivalry, were content to exploit the profitable home market. The rate of innovation was slow. What emerged was a tendency to administer existing wealth rather than to invest vigorously to create new wealth. This old order has had strong repercussions throughout the diamond.

2. GOVERNMENT'S OVERALL EFFECT ON THE OLD ORDER

As discussed in Chapter 3, government's proper role is to challenge and raise the sights of industry. Government does this by improving the quality of the inputs that firms draw upon, and by creating a competitive context that promotes upgrading. The most effective government policies are those that create an environment which stimulates companies to gain competitive advantage, rather than involving government directly in the process.

Judged on these criteria, the government policies that we have discussed in the previous chapters have often not measured up. In fact, Canadian governments, both federal and provincial, share responsibility for the weaknesses that exist in the economy.

While the myriad of specific government policies affecting the diamond have already been discussed, a broader pattern can be discerned. Those policies that have most hampered competitiveness in the Canadian economy can be grouped into a small number of major themes that are outgrowths of the old economic order.

A. Insulation from External and Internal Competition

Historically, considerable effort has been directed at insulating the Canadian economy from external pressures by protecting firms from international competition and safeguarding national autonomy. This latter goal has been considered important given Canada's proximity to the much larger United States. Canada's traditionally high tariffs were probably the most important example. They worked to reduce pressures on domestic firms to upgrade and, by restricting choice, limited the beneficial stimulus of sophisticated Canadian demand.

Historically weak competition policies were a natural outgrowth of the view that companies had to be large to compete with foreign firms. Canadians, as earlier noted, believed in large organizations as a "defensive necessity." Rather than seek to achieve economies of scale through an international market presence, these laws encouraged firms to expand in a protected and less competitive home market.

Interprovincial trade barriers, of which procurement policies are just one component, have limited domestic rivalry in Canada as well as foreign competition in some industries. They have also served to prevent Canadian firms from accessing sophisticated home customers and artificially reduced the size of the home market.

The procurement policies of federal and provincial governments have also provided insulation from both external and internal competition. While many countries' procurement policies are skewed against foreigners, Canadians have also discriminated against one another.

B. Forestalling the Need for Upgrading

Canadian government policies have often sought to remove the need for upgrading rather than encourage it. A good example is the federal government's management of grain transport in Canada. The Crow rates in fact encouraged the shipping of bulky, unprocessed products. Rates reflecting true cost would have created pressures for moving to more processed products. Artificially constrained factor input costs -- in industries as diverse as transportation, hydroelectric power and agriculture -- lessen pressures for upgrading and reflect a static, cost-based conception of competition. In fact, it could be argued that the current Canadian preoccupation with bringing down exchange rates is a reflection of the old mindset.

C. Direct Intervention Instead of Business Action

Canadian governments have had a strong tendency to intervene directly in competition rather than stimulate upgrading by industry itself. Examples of this abound, but are most frequently found in the area of factor conditions. Canadian government R&D spending at both the federal and provincial levels has traditionally been concentrated on government laboratories rather than through educational institutions or incentives for company R&D investments. Even today, the federal government spends a higher proportion of its R&D dollars on in-house research (55 percent) than any other G7 nation apart from France.

In many policy areas, particularly in science and technology, and education and training, private sector participation has not been well leveraged. It is difficult to know which came first, a complacent private sector or an overly protective government. Yet governments have helped to create and sustain a relationship of dependency. It is revealing that in a recent survey among members of the Canadian Manufacturers' Association, only 23 percent gave their unconditional support to "voluntary apprenticeship programs." However, 53 percent stated they would support the concept if government support was forthcoming. On average, members felt that government should provide 46 percent of the funding for the program.[1]

Direct intervention in the form of subsidies and bailouts has also been a prominent feature of the Canadian landscape. The federal government has pledged direct contributions of $1.0 billion and loan guarantees of $1.6 billion to the Hibernia oil field development. Bailouts have been a frequent occurrence in industries such as aircraft assembly and fisheries. Provincial governments have also pursued large-scale projects -- such as the Sprung greenhouse facilities in Newfoundland, the Bricklin auto plant in New Brunswick, and Churchill Forest Industries in Manitoba -- through initial funding grants or costly bailout packages. All three projects are examples of provincial government support for large-scale development that both promoted dependency on government and ignored important requirements for success, particularly the presence of fertile supporting industries.

Canada is not alone in using these types of policies, which have been universally unsuccessful. New Zealanders, for example, will be paying for decades the costs of several large industrial development projects undertaken by the government in the 1970s. Similarly, government development projects in southern Italy have drained Italian resources for many years.

D. Programs to Distribute Wealth and Improve Welfare that Needlessly Undermine the Economy

There is a strongly held belief in Canada that all citizens have a right to essential services such as health care and education, a minimum standard of living maintained by social welfare programs, and the opportunity to be employed. These beliefs are at the heart of the Canadian identity and indeed are admirable. Yet their implementation has often proven counterproductive.

As we have discussed, the funding of extensive social programs has necessitated higher tax rates in Canada than in the U.S., for example, which in turn influences the goals and motivations of individuals. In the area of agriculture, marketing boards and price support policies, designed to offer income support to farmers, have resulted in production inefficiencies. That other nations are willing to engage in costly, inefficient agricultural policies is no reason for Canada to do the same.

Perhaps most importantly, Canada's commitment to employment has frequently been used to justify protective strategies that preserve jobs in the short term, but simultaneously distort rivalry and delay necessary adjustment. Canada seems particularly vulnerable to such actions, given the high incidence of single-industry towns centred around resource extraction.

The effectiveness of the substantial resources devoted to the task of narrowing regional economic disparities has often been undermined by programs which emphasize diversification rather than building on regional strengths. Programs have had disappointing results by not building on established clusters. Government funds have also become overly diluted by efforts to distribute spending in areas such as science and technology and education. In the early 1980s, for example, the Department of Regional Industrial Expansion yielded to pressures to establish microelectronics centres in most provinces, rather than concentrating its program funding in one or two regions. As a consequence, the size of project grants for each centre proved inadequate, and all but two were forced to fold their operations within two years of startup.

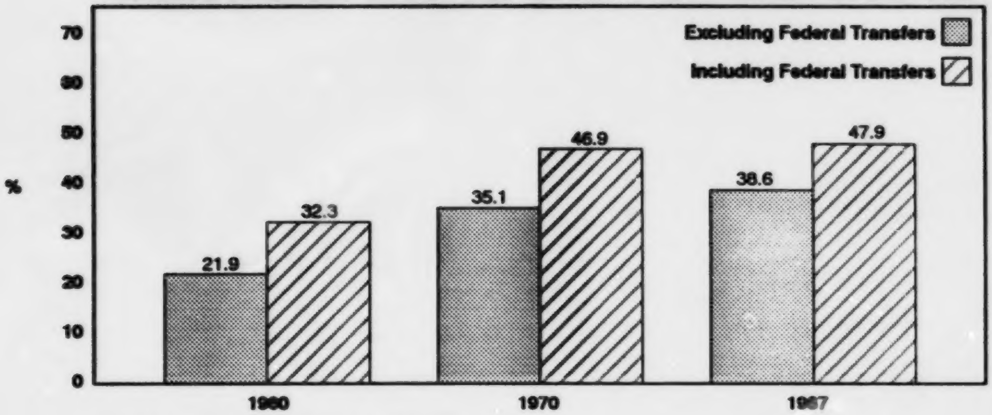
This theme of fragmented expenditures and a lack of building on strengths is seen in a variety of government policy areas affecting most of the determinants. For example, Canada's space policy is mandated to "ensure that contracts are distributed fairly across the country," although Canada's core aerospace cluster resides largely in Quebec and Ontario. Indeed, the recent proposal to build the Squalus jet trainer manufacturing facility (a closely related industry to the aerospace cluster) in Saskatoon represents a potentially short-sighted manifestation of this policy's intent.[2] Canada's export promotion efforts provide a further example of widely dispersed financial support. Some 38 industry sectors received export promotion support in 1989, with some receiving as little as $5,200 (accommodation, food and beverage).

E. Conflicting Government Policies and Objectives

One distinguishing feature of the Canadian economy is the decentralized nature of power sharing and the ambiguity over which level of government has jurisdiction in key policy areas. No one level of government in Canada controls a full set of variables in any given policy area, which complicates the process of policy development and implementation. In fact, there has been a growing decentralization of both fiscal and political power and increasing calls for even more. Over the last 30 years, the provinces have accounted for a growing proportion of total government expenditures (see Figure 10.1).

Figure 10.1

PROVINCIAL GOVERNMENT EXPENDITURES AS A % OF TOTAL GOVERNMENT EXPENDITURES



SOURCE: PROVINCIAL ECONOMIC ACCOUNTS

A high level of policy coordination is necessary to make Canada's decentralized system work, but such coordination has been lacking in many areas. In labour market programs, the provinces set and enforce employment standards, while the federal government maintains responsibility for training and unemployment compensation. This leaves the provinces free to set overly high minimum wage standards without bearing the cost of the increases in unemployment compensation that may result.

Furthering Canada's science and technology capabilities has also been hampered by a lack of coordination between federal and provincial research bodies. The lack of clearly distinct mandates for Provincial Research Organizations (PROs) has often placed these groups in conflict with similar federal agencies, resulting at times in a duplication of resources and capabilities.

A further illustration of difficulties that arise from conflicting objectives is found in the management of Canadian fisheries. Constitutionally, the federal government controls all aspects of stock management, including quotas and conservation measures. The provinces, however, have established control over the fish processing sector, primarily through licensing and industrial assistance to new plants, by way of their jurisdiction over property rights. While the federal government's objectives centre on resource management, the provinces have focused on employment objectives. These conflicting objectives have resulted in a dissipation of the fisheries' resource rents, in part because of investments in excess of processing capacity. In 1988, 34 applications for plant financings were rejected by the federal government as not economically viable; 22 of these same applications were subsequently approved and given financial support by provincial governments.

Overall, jurisdictional overlap has often added a layer of complexity and compounded the level of uncertainty that firms face in anticipating changes in the business environment.

3. A FOCUS ON DIVIDING UP THE PIE

Abundant resources and the historic lack of external and internal pressures have allowed Canadian firms, labour and governments to all achieve their respective goals without major change or sacrifice. Satisficing rather than optimizing behaviour was common. Firm profitability has been high despite often inefficient facilities. Compensation has risen faster than productivity. Governments have used economic prosperity to fund a generous social system. As the old order has been crumbling, there is evidence that governments' expenditures are rapidly outstripping the nation's ability to pay for them.

Canada's wealth has also provided little incentive for labour, management and government to work together to improve national competitiveness. The motivations of different constituencies have often focused on capturing a larger share of existing wealth, rather than working together to increase it.

Significant chasms now exist between the three constituencies and within government itself. The relationship between labour and management has often been confrontational. Union resistance to the application of higher skill sets, such as multiskilling and to productivity enhancement, has impeded the upgrading of Canada's human resources. At the same time, management has seldom treated labour as partners. Canadian labour-management relations have often been perceived as a zero-sum game, with the constituencies fighting over their share. In a more competitive global environment, these fights become internecine, resulting in worse outcomes for both sides.

Labour and government have also not worked well together. Labour has often taken on an adversarial role with respect to many aspects of economic policy, while governments' relations with their own workforces have also sometimes been strained.

Canadian companies have looked for government assistance in export promotion, investment in specialized infrastructure, government procurement, and other forms of support. They have, however, rarely cooperated with governments in areas that have important impacts on international competitiveness, such as R&D, training and education.

The federal and provincial governments have struggled over roles and mandates. This has led to conflicting and overlapping programs that have worked to the detriment of the economy. To make matters worse, the relationships of labour and business with governments have shifted significantly depending on which political party is in power.

These attitudes and behaviours reflect the old competitiveness paradigm. Business acted as if economic rents would go on forever and moved to exploit the sheltered Canadian market. Labour acted as if jobs and high and rising wages could be taken for granted, because business profits were high and secure. Governments acted as if ample resources would continue to exist to fund social needs.

The chasms we have identified among constituencies represent a significant impediment to positive adjustment in the economy. In countries such as Switzerland

and Germany, in contrast, cooperative relationships between the constituencies have resulted in policy stability and more peaceful labour-management relations. These have contributed to a climate in which firms and individuals invest in continued improvement and upgrading of their skills and capabilities.

4. FORCES OF CHANGE

A. Growing External Pressures

As we have seen in our discussion of the determinants of competitive advantage, the Canadian economy is increasingly coming under external pressures. Forces of change are disintegrating the old order.

The most important pressure is growing international competition. A more open trading environment and rapid growth in international trade and investment has been the result of declining transportation and communication costs and a lowering of both tariff and non-tariff barriers to trade through GATT negotiations, the emergence of trading blocs (for example, EC, ASEAN) and bilateral agreements. This means that firms in most Canadian industries are increasingly exposed to international rivals.

The Canada-U.S. Free Trade Agreement has represented a watershed in exposing Canadian industry to international competition. As previously discussed, however, the FTA only accelerated a process of tariff reduction that was well underway. The FTA recognized the inevitable: that Canada could no longer sustain a position walled off from international competition if it wanted continued access to foreign markets. While some Canadian industries will clearly suffer in a tariff-free world (which should not be surprising, given the relative inefficiencies of some Canadian industries) and some structural adjustments will be painful, on balance the FTA represents an extremely positive and inevitable step for Canada. Without the FTA, Canadians might have believed they were better off for a few more years, but would have put off the inevitable process of change, only raising its cost.

How then will free trade affect the Canadian diamond? Obviously, free trade with the U.S. will not affect the endowment of inherited factors that has been such an influence on Canada's economic development. However, many advanced and specialized factors have typically only limited interchangeability and will be difficult to access in the U.S. Similarly, while access to U.S. related and supporting industries should increase, it will be a relatively slow process.

Industry rivalry and demand conditions are likely to be determinants where Canada will be able to draw somewhat more benefit from the stronger U.S. diamond. Greater access to U.S. products, combined with the similarity of cultures, means that Canadian buyers will raise the level of sophistication that may have been blunted by domestic supplier industry concentration and high tariffs. The exposure to greater rivalry from U.S. firms will compensate, in part, for the lack of strong domestic rivalry in many industries, although it will yield a harsher but quicker adjustment process in some industries than would otherwise have occurred.

An additional consideration is that free trade will magnify differences between the two nations' economic systems. With the increased mobility of both firms and individuals that will likely develop, differences in tax policy, for example, could produce a loss of skilled individuals and firms from Canada. Unlike the EC, where the nations tend to have very distinct cultures, the strongly shared culture of the two nations makes this fluidity more likely.

The growing strength of developing nations represents another significant external pressure with which Canadian firms increasingly must deal. Many of Canada's export industries are accessible to developing countries, which have their own natural resources, low labour costs and often subsidized capital. Nations such as Brazil, Mexico, Venezuela and Argentina, as well as Asian nations such as Korea and Malaysia, represent significant competitor nations whose influence is likely to increase significantly even in the near term. While nations such as Korea are likely to make their presence felt most keenly in manufactured goods, many of the Latin American countries such as Brazil and Venezuela and emerging nations such as Malaysia are likely to make major inroads in the upstream, resource-based industries and thus represent more of a threat to the Canadian export base.

Finally, Canada faces threats to its natural resource positions that were described in Chapter 6. Natural resources alone are likely to be a less compelling advantage in the future.

Given these external changes, Canada's future competitiveness must be driven by a new paradigm. This paradigm, based on productivity and innovation, is what has been driving competitiveness in most of the other advanced economies.

Major structural adjustment in Canada is inevitable. The question is whether the adjustment is positive or whether it leads to an erosion in standard of living. Also at issue is how long and painful the restructuring process will be even if business, labour, and government are moving in the right direction. How long will it take for Canada to transform itself from the old paradigm to a new one? And how much will it cost?

External pressures, which Canada now faces, may not ensure a positive outcome in the absence of greater internal competition. That is what the history of New Zealand suggests. If an economy is exposed to external pressures by reducing trade barriers, liberalizing currency and entering the international arena while the internal structure of the economy does not change, the result can be a downward spiral. In New Zealand, the economy simply could not respond positively to external pressures because of rigid labour markets, faulty capital markets, inadequate skills and incentives, and other deficiencies.

Clearly, Canada is not New Zealand. Government and business are already beginning to deal with some of the internal competitive issues in the economy. The question is whether the country is moving rapidly enough.

B. The Process of Adjustment in Canada

As external pressures are increasing, Canadian firms are beginning to experience greater internal pressures. This is due partly to a number of government policies that are increasingly oriented toward providing a more challenging competitive domestic environment, and partly as a result of positive initiatives taken by firms themselves.

At the federal level, positive government steps include the recently strengthened competition laws, privatization of crown corporations, and efforts to deregulate industries, including energy and transportation.

Government is also beginning to employ policies that encourage, and even pressure, firms to upgrade. Tax reform has reduced past distortions, and generous R&D incentives are in place. Increasing the private sector's commitment to training is at the heart of the federal government's new Labour Force Development Strategy, discussed in Chapter 6. UIC reform has improved incentives to return to the workforce, though more must be done. In the area of science and technology, a rising number of government programs are being oriented to priorities driven by the private sector.

In response to the significant external and internal pressures facing the economy, we have also seen signs of positive change in a number of industries studied, including industries in the resource sector. For example, Inco has taken significant steps to upgrade its mineral extraction and smelting technologies and improve labour-management relations. A number of companies in the pulp and paper sector are beginning modernization programs. Other firms have begun to reposition their activities in light of intensified competition by becoming more focused and effective producers.

5. SYSTEMIC BARRIERS TO CHANGE

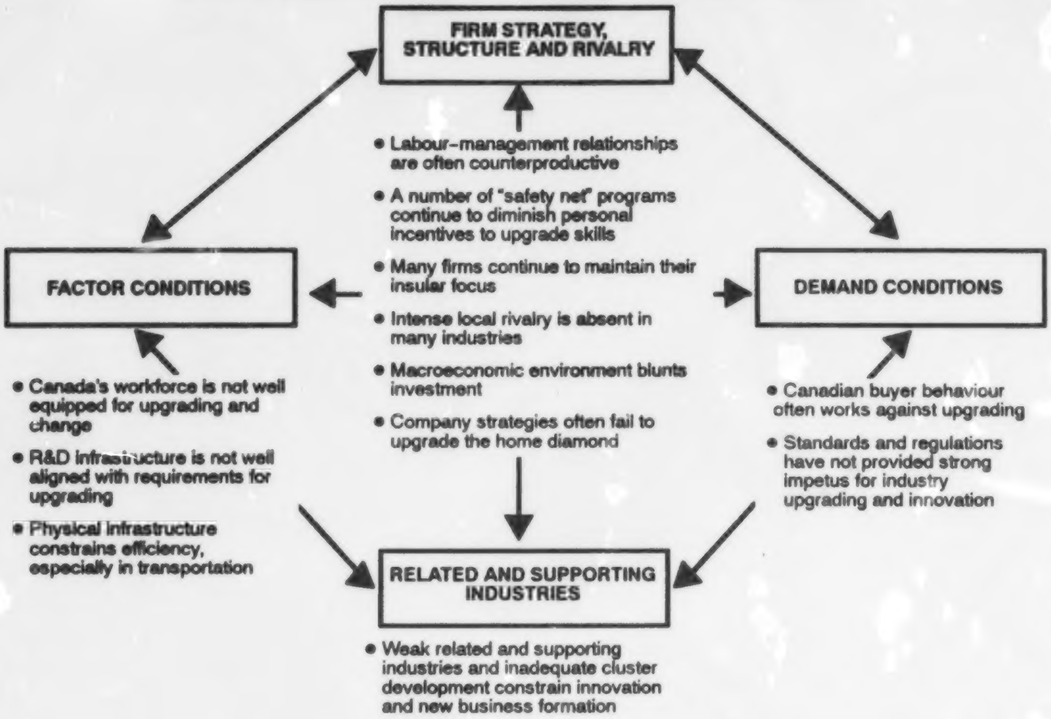
With increasing external pressures and some positive internal initiatives, one might be tempted to hope Canada's weaknesses will be corrected naturally. Such pressures are indeed crucial to the upgrading process, and Canadian firms have demonstrated an ability to adjust in the past.

However, the vestiges of the old economic order in Canada have imposed significant barriers to upgrading. These barriers are systemic, not isolated. They reside in policies, institutions, and attitudes that permeate the economy. The old economic order consisted of a large number of internally consistent conditions. Moving to a new order requires similarly pervasive change.

The challenge is heightened by the fact that the diamond is an interdependent system, in which the weakest link constrains progress. The level of rivalry in Canada can rise, for example, but shortages of skills or weaknesses in supplier access will limit the resulting pace of upgrading. Simultaneous progress on a number of fronts, by business, labour, and government, will be needed to put Canada on a new path and maintain the standard of living.

While some necessary steps are being taken, the discussion in previous chapters clearly indicates that the current extent of change is inadequate. Some of the most significant barriers to upgrading are shown in Figure 10.2.

Figure 10.2
MAJOR SYSTEMIC BARRIERS TO UPGRADING THE CANADIAN ECONOMY


FIRM STRATEGY, STRUCTURE AND RIVALRY
• Labour-management relationships are often counterproductive
• A number of "safety net" programs continue to diminish personal incentives to upgrade skills
• Many firms continue to maintain their insular focus
• Intense local rivalry is absent in many industries
• Macroeconomic environment blunts investment
• Company strategies often fail to upgrade the home diamond
FACTOR CONDITIONS
• Canada's workforce is not well equipped for upgrading and change
• R&D infrastructure is not well aligned with requirements for upgrading
• Physical infrastructure constrains efficiency, especially in transportation
DEMAND CONDITIONS
• Canadian buyer behaviour often works against upgrading
• Standards and regulations have not provided strong impetus for industry upgrading and innovation
RELATED AND SUPPORTING INDUSTRIES
• Weak related and supporting industries and inadequate cluster development constrain innovation and new business formation

As we have noted before, there is no one diamond that describes all industries in Canada -- each industry has a unique diamond, the strength of which is driven by features specific to that industry. Therefore, the barriers we have identified vary in their importance to and impact on specific industries. However, virtually all industries we have examined are affected by at least some of these barriers.

Canada's workforce is not well equipped for upgrading and change. The basic skill levels of many citizens are inadequate, in spite of high per capita spending on education. Shortages exist or are looming in skill- and technology-related occupations, a vestige of the old order. Specialized skill development is lagging due to poor vocational apprenticeship training and weak links between educational institutions and industry. Finally, company investments in training are low compared to other industrialized nations.

Canada's R&D infrastructure is not well aligned with requirements for upgrading. Canada has a low overall rate of R&D spending and too much of it takes place through government laboratories. The links between publicly funded research institutes and industry are poorly developed. The effectiveness of government R&D programs has been diminished by objectives which often include regional development and scientific rather than commercial merit. University-industry R&D linkages are also underdeveloped. The supply of highly qualified personnel may be inadequate for future research needs.

Canada's physical infrastructure is adequate to support the general needs of industry, but is often lacking in specialized areas. Despite recent regulatory progress, critical bottlenecks in areas such as transportation unnecessarily reduce efficiency.

The level of sophistication of Canadian home demand also works against upgrading. Canadian consumers are rarely leading-edge buyers and appear less inclined than consumers in other nations (for example, the U.S., Japan) to embrace new products. As industrial buyers, a price-sensitive, low-cost mentality is prevalent in many sectors. Canadian firms are generally risk-averse purchasers, who have often proven shortsighted in their patterns of technology adoption. Canadian governments have also been relatively unsophisticated buyers, following explicit and implicit procurement policies that restrict competition, particularly at the provincial level.

Standards and regulations have not provided a strong impetus for innovation in Canada. Environmental standards have rarely been anticipatory; their effectiveness has frequently been hampered by the choice of regulatory instruments used to enforce the standards. In addition, existing standards have not been consistently applied. Product safety standards, while generally more stringent, have often been oriented toward consumer protection rather than enabling consumer choice, which further dulls the innovative edge of Canadian firms.

Weak related and supporting industries, as well as inadequate cluster development, constrain innovation and new business formation in Canada. Most of Canada's competitive clusters are both narrow and shallow. Indeed, the lack of Canadian process equipment manufacturers is particularly striking and contributes to the weakness in process technology development and adoption in this country. The implications of this are threefold: first, the critical inputs that drive innovation are often imported into Canada. Second, few benefits are derived from inter-industry spillover effects. Third, the lack of developed clusters makes it harder to develop the critical mass required for specialized factor creation and upgrading.

Labour-management relationships in Canada are often counterproductive and represent a throwback to the old order. A number of Canada's "safety net" programs continue to diminish personal incentives to upgrade skills. Too many Canadian firms continue to maintain an insular focus, concentrated almost exclusively on the domestic market.

Limited rivalry has characterized much of Canadian industry. It has also encouraged firms to extend their participation in a comfortable Canadian marketplace, leading to overly broad product scope, questionable levels of vertical integration in some sectors, and a high degree of corporate conglomeration.

Canadian macroeconomic policies have further blunted investment and upgrading. Chronically high government deficits and poorly coordinated fiscal policies at the federal and provincial levels have contributed to a less attractive climate for investment and driven up the exchange rate.

Canadian company strategies often work to reinforce these systemic barriers. Many Canadian firms remain cost-focused. They do not seek out and train enough technically skilled employees. Spending on innovation and R&D remains low. Efforts to nurture local suppliers are rare.

In many ways, however, the most significant barriers to upgrading are attitudes. Too often, the old mindsets are still in place in business, labour, and government. Canadians still see competitiveness in terms of the old paradigm, which points to inappropriate responses to the current difficulties. The chasms between constituencies fostered by the old economic order create suspicions and delay needed changes. The old dependency on government constrains actions by the private sector.

6. THREATS TO CANADIAN INDUSTRIES

The forces we have described in general terms can be translated into specific threats in the broad categories of Canadian industries first identified in Chapter 2. These individual threats differ from group to group, though their underlying causes and implications are similar.

A. Resource-Based Industries

Given its abundant level of factor endowments, Canada's heavy emphasis on resources is not surprising. These are the industries that have made Canada wealthy. Yet the sustainability of these industries' competitive advantage is in question. Depletion of resources is a threat to both renewable resource industries, such as fisheries (where a number of factors can upset projected equilibrium levels), and non-renewable resource industries where new sites are often more remote and expensive. Although the trend is toward better stewardship of its resource base, Canada's natural resource management practices often lag behind those of competing nations and in some cases will require substantial investments merely to catch up.

The biggest problem is perhaps the emergence of lower cost competitors. Basic factor advantages are increasingly replicated by countries such as Venezuela in aluminum, or Brazil in pulp and paper. Apart from the resource costs themselves, Canada does not generally have strong cost positions in activities that are driven by labour rates, productivity, and the age and efficiency of capital stock. In these areas, Canada has often failed to make the investments necessary, such as upgrading process technology to increase the efficiencies in production that would yield a stronger position. Unless Canada upgrades its resource-based industries, it will be trapped in segments where investments tend to be inflexible and where its marginal costs are higher than major competitors. This threat will grow, even if Canada's resources do not deplete significantly.

B. Market Access-Based Industries

Many of Canada's market access-based industries, initially spawned in an environment of high tariff barriers, are seriously threatened by the increasingly open trading environment. As trade barriers continue to fall, market access no longer requires a major production base in Canada. Many firms are now in the process of reconfigured their North American and, in some cases, global operations. A number have already made decisions to move production out of Canada, taking with them not only jobs, but also valuable skills and expertise.

While the sunk nature of certain assets will slow the pace of change in some industries, reinvestment and new investment decisions will be made on the basis of the new circumstances. Maintaining the existing foreign investments and attracting new foreign direct investment will be decided purely on the basis of the relative attractiveness of the Canadian diamond and the relative productivity of Canadian operations versus alternate locations. Yet the Canadian activities of foreign firms often lag these alternate location, in productivity.

The future of the Auto Pact industries, for example, depends partially on the agreement itself and partially on the ability of Canadian facilities to operate as or more efficiently than their counterparts in the United States. The plant closings noted earlier raise serious questions about whether this is the case. The future of Canada's other market access-based industries will depend on Canada's ability to provide a favourable home base for these companies so that Canadian subsidiaries can become global or North American home bases for a product line or set of product lines. Unless there is systemic change, an erosion in this section is likely.

One particularly unattractive aspect of many Canadian industry diamonds is inter-provincial barriers to trade. By moving to the U.S., firms may encounter virtually no penalty in terms of access to other Canadian provinces, given present trade barriers between provinces. Clearly, if effective barriers remain, firms that choose to stay in Canada are unlikely to invest as much in upgrading their existing facilities in Canada than if these barriers were removed.

Many Canadian firms are also tied into U.S. industries that are threatened. The U.S. auto industry is a case in point. As long as Canadian firms have not developed the capacity to sell to German and Japanese firms, the future of this sector is in question.

C. Innovation-Driven Industries

Canada's innovation-driven industries are tangible proof that Canada can achieve an innovation-driven economy. Yet these industries may also be at risk. Firms that have prospered in spite of weak Canadian clusters may find this weakness increasingly eroding their competitiveness. Firms in such industries may move their home bases outside of Canada to take advantage of more favourable diamonds elsewhere. There is already evidence of this occurring, as the cases of Seagram and Northern Telecom attest. This possibility applies equally to both foreign- and Canadian-owned firms, both of which will enjoy a wider range of options for locating home base activities. Even those Canadian industries within strong clusters are at some risk because of the systemic barriers to upgrading that are present. Without access to advanced skills, efficient infrastructure, and capable suppliers, such industries may slowly migrate home base activities out of Canada.

7. MOVING TO A NEW ORDER

Structural change in the Canadian economy is inevitable. What is needed is a move to a new order that will maintain and enhance the nation's standard of living. It must be a new order in which barriers to upgrading are eliminated, and where internal and external competition stimulates dynamism.

The changes now underway in Canada are too piecemeal to ensure a positive outcome. Moving to a prosperous new order will require a more integrated vision of what Canada can accomplish if it engages in systemic reform. We attempt to outline such a vision in the last chapter.

CHAPTER 11

TOWARD A NEW ECONOMIC VISION FOR CANADA

As stated at the outset of this study, we believe Canada is at an economic turning point and Canadian industry, governments, and individuals must choose how to respond. One path is to cling to the old economic order and to attempt to resist the process of change. Another is to continue building on recent economic reforms and further the process of systemic adjustment in the economy. We are convinced that the latter path will best ensure Canada's continued prosperity.

We have endeavoured in this study to present a broad and holistic perspective on the Canadian economy that shows how the many disparate influences on competitiveness fit together. Above all, our aim has been to provide a new way of thinking about competitiveness. While all salient issues and policy areas could not be discussed in detail, the principles for judging any public policy or company strategy should be clear.

The central goal for the Canadian economy should be productivity growth. This depends on a continual process of upgrading, which rests on improving skills, technology and infrastructure, the presence of sophisticated buyers and suppliers, and, above all, competitive pressures. While companies can and must compete globally, the ability to upgrade depends fundamentally on conditions in Canada, which will determine what both Canadian and foreign-owned companies will choose to do there.

The mandate of this study has been to diagnose the state of competitiveness in Canadian industry and to highlight the most important priorities for change, rather than to generate detailed policy recommendations. The task of fashioning specific policies and action plans must fall on Canadian policymakers and private sector leaders themselves. It is they who have the ultimate responsibility for making the necessary complex social and political tradeoffs.

Change in Canada needs to be systemic and must take place throughout the diamond. It is required in both the public and private sectors, and on the part of both management and labour. Canada must make simultaneous progress across a range of fronts, including education, science and technology, regulation, competition, and incentives. The diamond is an interdependent system in which the state of one determinant has a marked impact on its ability to benefit from other determinants. (The tendency to focus on one or two weaknesses in Canada, so common in studies of economic policy, will fail to produce the desired result.)

Moving to a new economic order will be uncomfortable for many and actively resisted by some. It will also involve inevitable short run costs. Most importantly, however, it will require a new mindset on the part of governments, business, labour and individuals, one which recognizes and adopts a new paradigm of competitiveness.

Companies have set strategies based on one set of external circumstances, and will face challenges in adjusting to a new one. Yet we are persuaded that the costs of change are less than might be supposed. What is needed is not new government spending and more programs, but less duplication and changes in the way existing programs are designed. What is needed is not greater company investment but new investment priorities and strategies to guide them. The result will be a more robust economy with better prospects for long-term productivity growth.

In this chapter, we begin by outlining Canada's major competitive strengths, on which its future economic policies should rest. We then outline some broad themes for a new economic vision for Canada, one that would provide a foundation for more rapid productivity growth. Making this vision a reality will require new approaches by all the major participants in the economy. We discuss some of the most important implications of this new vision for firms, labour, and governments.

1. STRENGTHS TO BUILD ON

Canada is in the favourable position of having a solid foundation on which to move forward with the process of economic change and upgrading, far more so than other resource-rich nations such as New Zealand and Australia. The country boasts a large export sector that accounts for over 25 percent of GDP, and holds a significant share of world trade. Many Canadian firms have proven that they can compete in global industries.

Canada also enjoys a large, rich, and diversified natural resource endowment, and ranks among the world's leaders in a host of renewable and non-renewable resources, ranging from arable and forested land to fisheries, minerals and energy. Canada's resource endowment has been a past strength, but in some respects it also represents a source of current weakness. The weakness is not in the resources themselves, but in the way they have been exploited, as well as the strategies and attitudes that have developed. However, with careful resource conservation practices and a reorientation of company strategies toward leading-edge technologies and more sophisticated products and processes, Canada's vast resource base can continue to be a source of competitive advantage into the future.

Canada's success in a number of highly contested global industries -- such as telecommunications, consulting engineering, nickel -- illustrates the intrinsic potential for continued prosperity. Canadian firms have proven that they can compete on the basis of innovation. Northern Telecom, CAE Electronics, Inco, and Canstar are a few examples of firms that are at the leading edge of technological innovation in their industries. They have built and sustained internationally competitive positions through constant commitment to R&D and technology adoption. Innovation and upgrading are at the core of their strategies.

These firms have created and drawn upon strengths in their home diamonds to achieve their international success. They have taken steps to create the specialized skills, technological infrastructure, supplier bases, and other conditions at home needed to sustain their competitive positions. Initiatives undertaken by governments and educational institutions have, in these industries, been well designed and had a positive impact on competitiveness.

There is a foundation in place in Canada that should allow such examples to proliferate. Canadian industry enjoys a good basic infrastructure, a core of university and other research capability, an educated human resource base with demonstrated potential, and a large pool of capital on which to draw. The challenge is to redirect government policies and company strategies to develop and build on this base.

With the advent of free trade, Canada can increasingly benefit from proximity and access to the large U.S. market. If attitudes and strategies are transformed, the U.S. will not only represent a significant and growing export market but also a source of products, technology and ideas. Proximity to the U.S. and more open trade will hasten the process by which the Canadian economy specializes in those areas where it performs best, thereby boosting productivity. At the same time, Canadian firms may be able to tap selectively into stronger U.S. diamonds to overcome weaknesses in Canada's competitive context -- in areas such as home demand conditions and related and supporting industries -- although, as we have stressed, this is not a panacea.

Finally, there is an increasing awareness of, and commitment to, competitiveness in Canada. Competitiveness has moved to the forefront of the minds of Canadian senior executives and policymakers. As we have discussed in Chapter 10, there have already been a number of positive initiatives in both the private and public sectors.

Increasingly, competitiveness is also a concern of the population as a whole. Awareness must precede action. Fortunately, awareness is increasing even while Canada's standard of living remains high. In New Zealand, by contrast, the country's relative prosperity had fallen precipitously before decision-makers were stirred into action.

2. THE ELEMENTS OF AN ECONOMIC VISION

A new vision for the Canadian economy is needed, one in which Canada's natural resource abundance is fully exploited, in which firms and governments focus on creating advanced skills and technology, in which sophisticated home demand drives more Canadian firms to create ever more sophisticated ways of competing, in which Canadian firms compete globally, and in which active competition in Canada provides the key stimulus for continual upgrading.

This does not mean that Canadian firms must compete in different industries than they do today. But it does suggest that Canadian firms must compete differently. They must employ different and more effective strategies, more advanced methods and technologies, and migrate into more sophisticated segments. In cases where industries cannot be upgraded, resources should flow to more productive uses.

While there are many specific steps necessary to raise productivity and improve the dynamism of the economy, we believe that a new economic vision for Canada is best defined in terms of a small number of overarching imperatives. Some of the most important of these are the following:

Become an innovation-driven economy. As we indicated at the outset of this study, the process of innovation, in the broadest sense of the word, is the critical requirement for upgrading. Canadian firms in all sectors must move to develop innovation-based advantages. This includes firms not only in the traded sector, but also in the non-traded sector, which influence national productivity and affect the costs and effectiveness of Canada's export industries.

Governments at all levels must align their policies with the goal of an innovation-driven economy. For regions such as Ontario, where resource-based industries represent only approximately 18 percent of total exports, the need to encourage innovation is particularly urgent. Yet, it is also critical that resource industries become innovation-driven, as we discuss below.

Increase the sophistication of the natural resource sector. Given threats to the sustainability of Canada's competitive position in many resource-based industries, increasing the sophistication of this array of industries will be vital to ensuring future competitiveness. Resource-driven industries have been and will remain a mainstay of the Canadian economy. However, government policies and company strategies need to change. Resource management practices must be continued and improved upon. To address threats to end-markets, the emergence of low-cost competitors, and declining real commodity prices, Canadian firms must substantially improve their productivity. They must develop and implement state-of-the-art production processes. They must develop the capability to produce products that use more advanced and specialized skills and technology. By moving into more sophisticated products and markets, firms can achieve a greater degree of differentiation, make use of more advanced technology, and broaden industry clusters. This will require new types of investment in process technology and skill development as well as longer term planning by managers of natural resource-based firms.

As we have discussed, Sweden and the U.S. are examples of countries that have had significant success in upgrading their natural resource sectors. In an era when its natural resource advantages are threatened, Canada must follow these leads.

Tackle barriers to upgrading throughout the economy. Both firms and governments must take steps to eliminate the barriers to upgrading productivity that exist throughout the economy. Although Canada has a pool of advanced factors (such as telecommunications infrastructure and an educated population), its mechanisms for developing its specialized skills, technology, and infrastructure lag rival nations and are insufficient to maintain Canada's long-term competitiveness. As Canada moves away from a closed market and reliance on resources alone for its export success, it will be more and more important to increase specialized skill and technology pools. At the same time, incentives must be shifted, wherever possible, to encourage work, investment and skill building. Finally, upgrading has often been inhibited by a lack of domestic rivalry. Although recent initiatives -- notably free trade, deregulation, and the reform of competition laws --have moved the country in the right direction, more attention must be given to increasing domestic rivalry in Canada.

Build on Canada's regional strengths. Our studies have shown that Canadian policies -- particularly regional and industrial policies -- have often put a higher priority on economic diversification than on competitive advantage. Provinces and regions within Canada should strive instead to build on industry clusters where they have established or nascent strengths. Heightened international competition will demand that Canadian firms possess true advantage. The experience of all the advanced nations we studied was that competitive industries emerged out of existing areas of strength rather than being created from scratch. The U.S. provides an example, in which the economies of states are specialized and built around clusters. Massachusetts prospers in information technology, health care, and knowledge-based services, while New Jersey prospers in pharmaceuticals and chemicals. Conversely, all the countries that attempted to attract isolated industries in the name of regional development -- among them Italy, Germany, the U.K. -- met with costly failure.

Move quickly and decisively to achieve complete free trade within Canada. The fruits of greater specialization will not be fully realized unless Canada becomes a single market. Canadian competitiveness in a variety of industries has been hindered unnecessarily by the existence of a bewildering array of internal non-tariff barriers to trade, investment, and labour mobility. These have worked against the development of sufficient scale in some industries and have dulled the rivalry necessary to achieve competitive advantage. The persistence of interprovincial barriers will drive foreign firms out of Canada in a free trade world. This is an area of competitive weakness that lies entirely within the control of Canadians to fix, and should be done with dispatch. It is encouraging that the federal government's recent proposals for constitutional reform promise to move toward internal free trade and a strengthening of the Canadian Economic Union.

Transform foreign subsidiaries into home bases. Canada's economy depends heavily on the subsidiaries of foreign multinationals, and is likely to for the foreseeable future. The issue is not whether there will be foreign companies in Canada, but what they will do. As we have discussed, freer trade and greater globalization of competition will cause multinationals to reexamine their Canadian operations. Branch plants whose sole *raison d'être* has been to serve the Canadian market will relocate if their productivity does not match or exceed operations elsewhere. Multinationals will also face choices about where to make investments in new skills, new technologies, and new product lines that will be governed by whether or not the Canadian environment is conducive to innovation and productivity growth.

The goal must be to create an environment in which foreign companies will not only maintain their Canadian operations, but upgrade them. The aim is for Canada to become the North American or even the global home base for product lines, business segments, and entire business units.

Create and maintain a supportive and stable macroeconomic climate. Finally, sound macroeconomic policies are a prerequisite to building a competitive, dynamic economy. Fiscal, monetary, tax, and regulatory policies should all be geared to achieving low inflation, balanced and manageable public finances, and a stable overall economic climate. Such policies lower the cost of capital and encourage the investment so crucial for upgrading. They also neutralize the tendency for companies to be distracted by interest rates and exchange rates, rather than to focus on the true underpinnings of competitiveness. A large body of international evidence suggests that public policies and private sector practices that aggravate inflation, seek to devalue the nation's currency, or create persistently large government deficits do not provide a basis for enduring competitive advantage.

3. IMPLICATIONS FOR CANADIAN FIRMS

Business, labour, governments (and other public sector institutions) and individual Canadian citizens must all play important roles in responding to these imperatives. A particularly heavy responsibility falls on companies and their managers. Firms, not governments, are on the front line of international competition. Forced to compete in a more global, open environment, firms must set strategies that will allow them to create and sustain competitive advantage. The Canadian home environment will play an important role in the ability of companies to respond to greater competition.

Canadian companies must move now to reexamine their strategies, not wait for government or outside forces to intervene. Canadian firms have often looked to governments for support and for policy changes that mitigate competitive pressures. This mindset is no longer adequate. The companies that gain competitive advantage are the ones that are constantly changing and innovating. They strive to create home diamonds that are superior to those of their foreign rivals. They invest in improving their home bases through a focus on training and R&D, rather than rely on governments to make these investments for them. Governments can play a valuable role in underpinning the competitiveness of a nation's industries, but they cannot themselves create competitive advantage.

While each industry will present different challenges, the following are the steps that will be needed to transform the competitiveness of many Canadian firms:

A. Assess the Canadian Diamond

Firms need to understand clearly their competitive position by product area as well as how their Canadian home base creates advantages and disadvantages. This will require that they assess themselves in a different way from the past. The important reference points will be the most formidable international competitors. These firms, as well as the national diamonds in which they are based, provide the benchmarks against which Canadian conditions must be assessed.

The following questions must be addressed in every Canadian firm:

The boundaries of the home diamond. What are the geographic boundaries of the "home" diamond? Is it national, regional or local? Does it appear to cross the border and if so, what are the key differences to firms operating on either side?

Sustainability of basic factor advantages. How sustainable are any advantages in raw materials, electricity, or other natural endowments? To what extent does the firm depend on explicit or implicit subsidies versus real advantages? How are international trading rules and foreign competitive circumstances likely to alter these advantages?

Quality of human resources. How does Canada compare in terms of specialized skills relevant to the firm's industry? Are Canadian employees as well trained and as well motivated as their foreign counterparts?

Technology access. Where does Canada stand in specialized technologies related to the industry? Are there research institutes or university research efforts that will allow Canadian firms to innovate?

Infrastructure access. How supportive is Canada's basic and specialized infrastructure in terms of the requirements for competitive advantage in the firm's industry? How does Canada compare with other countries?

Canadian demand sophistication. Is Canadian demand for the firm's product sophisticated, and does it anticipate international needs? In what segments are Canadian demand conditions the most favourable? Are regulations in Canada ahead or behind those elsewhere?

Supplier access. Does the firm have better or inferior access to local suppliers in important technologies than foreign rivals?

Relationship with related industries. What are the related industries that will most influence industry competition? What strengths does Canada have in these industries?

State of the diamonds of the most significant competitors. Who are the most significant foreign competitors in the industry? What are the elements of their diamonds that provide them with the most significant strengths and most important weaknesses? Do competitors have the potential to move into new segments? Which ones?

Potential entrants. Who are the emerging potential entrants? What is their cost position and their access to low-cost natural resources, cheap labour, or government subsidies? Do potential entrants have the ability to move into new segments? Which ones?

Overall cost position. What is the firm's overall cost position vis-à-vis the best North American and world rivals? Where does the Canadian environment contribute to cost advantages and disadvantages? How does labour and capital productivity contribute to cost position? How fast is the firm's productivity growing relative to foreign rivals?

Capacity for differentiation. What are the sources of differentiation relative to rivals? Are there products or segments in which the firm is more innovative?

Given the answers to the questions posed above, the task is to understand where the Canadian economic environment creates the most favourable circumstances for innovating.

B. Move Toward Innovation-Driven Modes of Competing

Many Canadian firms have long pursued static, cost-based strategies in which they produce "me-too" products and depend on factor costs or pure scale to provide advantages. A large number of such firms are now feeling pressure from foreign rivals with more efficient processes or with even cheaper basic factors.

Canadian firms must upgrade the sophistication of the ways in which they compete. A broader and more dynamic view of cost will be needed. Firms must invest in state-of-the-art processes, strive for continuous growth in labour productivity, and begin to innovate in process technology. Incremental improvements and minor upgrades may not be enough. Canadian firms will be required to make substantial investments in efficiency-enhancing and environmentally friendly technology.

Firms that face emerging low-cost foreign competitors may also need to reorient their strategies from manufacturing unprocessed and semi-processed products (where competition is necessarily based on cost) to a greater emphasis on more highly processed products in related segments. While many Canadian firms do manufacture a wide product range, too many focus in export markets on less sophisticated items, and manufacture more skill- and technology-intensive lines for the Canadian market only.

Greater Emphasis on Strategies of Differentiation. More Canadian firms must move toward strategies of differentiation, in which unique products or superior quality command a premium. This will be most likely in segments where Canadian demand or supporting industries are distinctive. Competing on differentiation requires continuous innovation and sustained investments in product technology, marketing, and often service networks.

Firms should actively seek to serve the most sophisticated and demanding Canadian buyers. Innovation and change require pressure. A deteriorating cost position or fierce domestic rivalry can provide pressure for change, but the direction of change often comes from buyers. Serving sophisticated customers, such as the U.S. Federal Aviation Administration in the case of CAE Electronics' flight simulator business, whose requirements and standards anticipate world market needs, allows firms to understand and respond to leading-edge demand. Canadian firms should seek out niches of sophisticated or demanding buyers to reap competitive advantages. Life insurance companies in Canada, for example, have been encouraged to develop new products by serving demanding group plan buyers and influential benefit consultants in Canada.

The lesson to be drawn from German, Japanese, and American success is the power of competing on innovation. None of these nations, the world's most prosperous, compete on factor cost. Their most successful firms, in industries ranging from Japanese electronics and machinery to German cars and chemicals to American software and medical products, have been the most innovative in products and/or processes in their respective fields.

C. Focus on Areas of True Competitive Advantage

A realistic assessment of the strength of the Canadian industry diamond will lead many Canadian firms to the conclusion that they must move to strategies involving greater focus. In a world of domestic competition and higher external tariffs, it was natural to proliferate product lines and businesses. The new imperative is to concentrate on those product lines, market segments, and businesses where Canadian firms can achieve sustainable advantage.

Rationalize Product Lines. Many firms should rationalize their product lines by concentrating on lines that draw on unique Canadian strengths and move aggressively to compete globally. They should eliminate or sell those lines that are not internationally competitive or likely to become competitive. Many firms will need to reduce significantly the number of product lines in which they compete. In the lines in which they do compete, firms must boost exports to sell in more foreign markets and globalize their strategies. Firms should avoid the temptation to hang on to uncompetitive product lines, because this often results in unintentional additional investment.

Experiences of firms based in other countries illustrate the wisdom of such strategies. With the imminent elimination of trade barriers in the EC, for example, many European pulp and paper manufacturers are focusing on building a greater European presence in fewer types of paper. Similarly, the Swiss firm Ricola, now a world leader in the manufacture of herbal candy, was once an also-ran, broad line competitor. It became internationally successful after it narrowed its product line to herbal candies (an area where the Swiss home base provides potent advantages) and focused on enhancing exports.

A number of Canadian firms have already begun this process. GE Canada, for instance, has narrowed its product line produced in Canada and increased its production of selected products to supply other GE operations worldwide. Culinar, a Quebec-based consumer snack food producer, is an example of a mid-sized Canadian firm that has also taken steps to reduce the breadth of its core product line, divest weaker peripheral businesses and focus on areas of advantage.

Canadian history also illustrates the wisdom of greater focus. During the 1970s, many Canadian manufacturing industries faced greater competition from abroad due to reduced tariffs, new competitors, or adverse exchange rate movements. Statistical evidence suggests that many Canadian firms reacted successfully to increased competition in the past by raising their levels of specialization.[1] The need to do so in the future will be palpably greater.

Reevaluate the Degree of Vertical Integration. Some firms will also find that they are more vertically integrated than their foreign counterparts. Managers should take a critical look at each area of vertical integration, and exit from those products where vertical integration does not provide a competitive advantage. Establishing close relationships to innovative outside suppliers will prove better for innovation.

Reduce Levels of Diversification. In an era of more open trade, efforts by Canadian firms to grow within Canada through unrelated diversification are ill advised and increasingly untenable. Firms must take a hard look at their corporate portfolios to evaluate whether they will continue to be viable in a new environment. For many, a greater focus on core businesses should be a high priority. Investments in such businesses will yield the greatest payoffs in both domestic and international terms. Again, there are a number of examples of Canadian firms already taking steps in this direction. In addition to the examples of Argus/Hollinger and Canadian Pacific cited in Chapter 9, other companies have taken similar actions. For example, Provigo has divested its operations outside its core retail food business and Domtar, a Quebec-based forest products company, has divested a number of non-core operations.

The requirement to focus on areas of true competitive advantage will mean that many firms in Canada must become more focused, but it does not mean that they must necessarily shrink. Rather, firms must concentrate on improving and growing their positions in the areas that remain. To do this, they will have to upgrade their capabilities and increase the sophistication of the products and processes in which, and by which, they compete.

D. Upgrade the Canadian Diamond

A move toward more sophisticated strategies will require an upgraded Canadian diamond. Canada must be transformed into a better platform for competing. A significant part of the responsibility for accomplishing this rests with Canadian firms themselves, not just governments.

Increase Investment in Specialized Human Resource Development. Like any asset, employees at all levels require investment to keep them up to date. Canadian firms, in general, invest far less in employee training than their rivals in foreign nations. Upgrading employee skills is less vital in a static environment in which products, processes, and customers seldom vary. The environment facing many firms in Canada today, however, looks far different. Firms will have to rely on advanced skills and improved productivity of their labour force as they move away from reliance on basic factor advantages and face more open competition. Firms must ensure that their employees have the skills required to meet the challenges of a changing environment. Firms cannot rely on governments to institute programs for them.

Firms should seek to learn from companies that have reputations for well established, in-house training programs in order to determine the most cost-effective manner in which to invest in upgrading workforce skills.

Firms may find that traditional capital budgeting techniques are biased against "soft" investments such as training. Comparisons with leading competitors, and other non-traditional performance measures, will be needed to ensure the adequacy of such investments.

Forge Closer Ties with Educational Institutions. Business in Canada has generally displayed a passive approach toward the educational system, viewing the provision of education as the responsibility of government. In today's competitive environment, firms must take a more proactive approach to ensuring that educational institutions are supplying employees with both the general and specialized skills required for competitiveness. Canadian business, like German business, should be providing direct input into course development at universities, community colleges, and technical institutes to ensure the relevance of courses to the needs of industry. Companies should be sending larger numbers of employees -- and not just managers -- to educational institutions to upgrade and enhance their skills through courses and seminars.

Firms should also actively promote and participate in more cooperative educational programs, where students work part-time or alternate work and schooling. More and more businesses in Canada are becoming involved with co-op programs. For example, Inco entered a partnership with Cambrian College in Sudbury to develop a 48-week course that combines academic studies with training at Inco. This is an effective means to develop the specialized skills needed in a firm's industry. Companies participating in co-op programs also find that such programs are an excellent way to recruit motivated employees and to fashion closer ties with educational institutions.

Finally, firms should be taking steps to ensure that community colleges and technical schools are not seen as "second-best" educational alternatives in Canada. In Germany and Switzerland, for example, such institutions are a major source of skilled engineers for industry. Possible ways of enhancing the status of these institutions include establishing industry-oriented "centres of excellence" at colleges and technical schools and providing them with financial support for research facilities, scholarships, or faculty positions. Where appropriate, company hiring and promotion policies should respect college and technical school qualifications and not just university-level credentials.

Improve Institutions for Technology Development and Adoption. Firms should also be playing a more active role in ensuring that work conducted at university research institutes or centres, and government laboratories, is commercially relevant. Firms need not perform all R&D activities in-house. Many successful firms contract out a great deal of their basic research and perform applied and developmental research in-house. Unfortunately, Canada has few specialized "centres of excellence" within its universities or community colleges where leading-edge research takes place, where the world's best professors come to teach, and where students are attracted from around the world. Firms should consider jointly funding and influencing the research conducted in such centres through trade associations with related industries and with government.

Transform Trade Associations Into Factor Creating Mechanisms. In Canada, the scope of activities of many trade associations has traditionally been limited to lobbying. The role of industry associations requires substantial change. They must become motive forces for developing specialized skills, technology and infrastructure.

For the small- and mid-sized enterprises that dominate in many sectors of the Canadian economy, the need to upgrade in the areas of human resources and technology development and adoption may appear to pose daunting challenges. Cooperative ventures can be a fruitful path to upgrading factor capabilities for such companies. For example, firms can expand technical assistance and provide more funds to trade associations to develop training programs relevant to their industry. They can support the development of training consortia in which labour and government may participate as partners to industry -- as has recently taken place in the electrical/ electronics industry.

Trade associations can also be a critical liaison between industry and educational institutes in helping to ensure the relevance of curricula discussed above. Finally, in the area of technology development and adoption, trade associations can also represent a valuable clearing house for dissemination of pre-competitive research into common areas of concern such as the environment.

Nurture Canadian Supplier Industries. The absence of dynamic clusters of competitive industries in Canada has been detrimental to innovation and change. Firms in Canada rarely work with suppliers to share skills and expertise. They are often quick to source inputs, particularly machinery, from suppliers in foreign countries. Although sourcing exclusively from abroad can be more profitable in the short term, it can diminish competitiveness in the long term. That Canadian industries often lag foreign rivals in process technology is one manifestation of the problem.

To compensate for the lack of supporting industries, some firms have chosen to integrate backward. Backward integration rarely, in our research, yielded the same benefits as strong and dynamic home-based supporting industries. While a number of firms have benefited from developing in-house supply capabilities, widespread sourcing from abroad and backward integration reduces incentives for Canadian-based suppliers to enter and invest.

Encouraging domestic suppliers, through local sourcing and transferring technology and skills, is an integral part of the strategies adopted by both IBM Canada and Nova Corporation. Other companies in Canada should follow their lead. Firms should also encourage suppliers to participate in overseas markets as part of their effort to upgrade them.

Nurturing suppliers will often demand a new attitude in purchasing. Many buyers in Canada, both in industry and government, use a make-to-blueprint procurement approach. Setting performance standards, as opposed to detailed design specifications, will spur greater innovation in supplier industries. The procurement practices of Japanese automobile manufacturers serve as excellent models. Not only do they set performance standards, but they work closely and continuously with local suppliers to enhance productivity and spur innovation.

Establish Links with Canadian-based Firms in Related Industries. Related industries are those linked to an industry by common technologies, distribution channels, skills or customers. Canadian firms should strive to develop links with Canadian-based firms in related industries in order to increase technical interchange and information flows in a variety of areas.

Strive to Develop and Serve Demanding Canadian Buyers. Firms should actively seek to serve the most sophisticated and demanding buyers in their home market. Innovation and change require pressure. A deteriorating cost position or fierce domestic rivalry can provide pressure for change, but the direction of change often comes from buyers. Serving sophisticated customers whose requirements and standards anticipate world market needs allows firms to understand and respond to leading-edge needs. Canadian firms should seek out niches of sophisticated or demanding buyers to reap competitive advantages. Life insurance companies in Canada, for example, have been encouraged to develop new products by serving demanding group plan buyers and influential benefit consultants in Canada.

Canadian firms also have a stake in making their customers more sophisticated and competitive. This will not only make them better buyers from the viewpoint of innovation, but support their growth. Educating and training local customers can pay large dividends.

Develop Labour-Management Relations Centered on Productivity. Adversarial labour-management relations have long been a fact of life in many Canadian industries. Not only does this erode short-term financial results, it can severely affect long-term productivity growth, customer and supplier relationships, and, ultimately, competitive advantage. For many companies, a marked change in attitudes will be required. In general, Canadian firms need to adopt less authoritarian approaches to workforce management, and adopt a broader view of employees' potential contribution to firm goals. Labour should be treated as a partner, not an adversary. Employees should be rewarded for productivity growth, but should also expect to share the pain in periods of economic adversity.

Such practices were typical in most successful enterprises and industries across the wide range of countries we studied. Management in many of these firms has been successful in working with labour, both union and non-union, to improve productivity through mechanisms such as quality circles, multi-skilling, and incentive pay schemes. Greater assurances of employment stability can enhance the potential of these mechanisms to strengthen productivity.

Sherritt Gordon's apprenticeship program for process operators, which allows for individual wage progression based on time, education, and demonstrated skills, is a prototype that should be replicated more broadly by Canadian companies. Another notable example is Shell Canada. Despite company downsizing, Shell has been able to structure its (unionized) Sarnia plant so that production workers essentially manage and supervise the operation. There are few work classifications, and both the company and the union have demonstrated a strong commitment to multi-skilling and teamwork.

Rely More on Performance-Related Compensation. As noted in Chapters 6 and 9, performance-based compensation plays a much smaller role in Canada than it does in the U.S. for both managers and workers. Clearly, this reflects an old order mindset that is incompatible with providing the appropriate incentives for individuals to upgrade their own skills and to share appropriately in the successes (and difficulties) of their firms. In structuring compensation systems, companies should move toward making both individual and company performance a significant part of remuneration at all levels.

E. Adopt More Global Strategies

The fruits of greater focus and upgrading will not be fully reaped without a more global approach to strategy. Sales abroad will generate the volume to replace the sales of discontinued products and provide the scale to support sustained investments. A protected Canadian market and proximity to the U.S. have historically encouraged many Canadian firms to focus on serving the Canadian or North American markets only. Approximately 70 percent of Canadian manufacturers do not export, while the majority of those that do focus solely on the U.S. In fact, Canada's reliance on the U.S. as an export market has increased over the past decade, at a time when globalization of many industries has significantly increased. Given a more open trade environment, firms in Canada must develop more global strategies if they are to compete successfully against foreign rivals who are themselves positioned to compete globally.

Competing globally means competing beyond North America. First and foremost, it involves penetrating foreign markets both through trade and, ultimately, foreign investment. If Canadian firms are to be successful in selling in international markets, they must address the needs of foreign buyers, establish foreign sales and service channels, and have the patience to make the investments necessary to build foreign market positions, including assembly facilities and selective foreign acquisitions.

When considering acquisitions, companies have a tendency to look first at their Canadian rivals in order to garner a stronger share of the Canadian home market. This approach may work to limit dynamism rather than enhance it. Instead, a better use of acquisitions is to fill out the global networks to accelerate the process of internationalization. For example, Northern Telecom's recent acquisition of STC, a U.K.-based supplier of switches and transmission equipment, should provide Northern Telecom with a greater ability to sell into the post-1992 European market.

In determining which international markets to focus on, firms in Canada should identify those markets where unique Canadian circumstances, such as its geographic dispersion, cold climate and often rugged terrain, provide important benefits. Canadian Fracmaster's Soviet joint venture in oil field services (discussed in Chapter 8) is a good example of this. In fact, the emerging markets of the Soviet Union, Eastern Europe and China should present enormous opportunities for Canadian firms.

Firms should shift inherently less productive activities to lower cost locations. Canstar, which manufactures 70 percent of the world's skate blades, has located its production in Italy due to cheaper steel and labour, the two largest cost components in blade manufacturing. Selective sourcing of components or machinery from abroad may also be advantageous, provided that it does not substitute for upgrading home base suppliers. Foreign sourcing is a good means of catching up with world-class technology and inputs, but not of innovating.

Competing globally also can bring other advantages. No nation has unique advantage in all of the determinants of competitive advantage. Firms can selectively tap into sources of advantage in foreign diamonds, both to compensate for deficiencies at home and to exploit unique characteristics abroad. The essential foundations of innovation must be present in the home base, however, and the role of foreign nations can only be selective.

Canadian firms will benefit by serving the most sophisticated and demanding buyers in foreign nations in order to keep apprised of the direction of global needs and to stimulate the development of better products and services. Given the relative ease of access to the U.S. market and the cultural similarity between Canada and the U.S., Canadian companies have an unusual ability to benefit from American buyers. For example, Canadian life insurance companies have historically adopted technologies from the U.S. market, where they have established branch offices to serve some of the world's most demanding buyers of insurance.

Selectively tapping into leading-edge foreign scientific research will allow firms to keep up to date with technological developments worldwide. For example, Nova Corporation recently purchased an R&D facility in Houston, Texas, a centre for oil- and gas-related research. The facility has developed a new method of making methyl tertiary butyl ether (MTBE), a replacement for lead in gasoline, and is currently licensing the technology to MTBE plants worldwide. However, efforts to source expertise abroad can often be expensive. It will require significant investments in capital and personnel. In addition, without a critical mass of technological capability at home, foreign research outposts will have no real impact.

There may be some cases in which Canadian firms should consider relocating their home bases for selected product lines or businesses, where the Canadian diamond is weak, and where efforts to improve it will be inadequate. More and more multinationals today, including IBM, Siemens and Nestlé, are relocating product line headquarters outside their home country.

The fact that many Canadian firms are small- and medium-sized does not preclude internationalization. Italy provides a clear example of a country heavily populated by small- and medium-sized firms that have developed a strong international export presence. Many of Italy's SMEs export up to 90 percent of their output in industries as diverse as textiles, packaging machinery, ceramic tiles and footwear.

F. Define a North American or Global Mandate

Foreign-owned or -controlled subsidiaries in Canada often face unique and especially urgent challenges. Foreign subsidiaries in the manufacturing sector tend to have broad product lines that overlap with those of subsidiaries in other countries. They also face the need to conform with their parents' global strategies. Productivity levels in many Canadian operations lag behind those found elsewhere, while wages are higher. The potential consequences of a weak Canadian diamond are particularly acute for these firms, given the ease and speed with which Canadian operations can be downsized and operations in other countries reconfigured to compensate.

Canadian subsidiaries must try to define a new role that is consistent with the evolving nature of global strategies being pursued by many of the world's most advanced multinationals. This is the role of North American or global headquarters for a particular product line or business segment. Canadian subsidiaries should begin now to target the product segments for which a Canadian home base offers unique advantages or is the most favourable, and plan their strategy around these product segments. A new mindset is needed concerning the role of foreign subsidiaries. Many managers need to accept, and even welcome, that their Canadian operations will be more focused in the future.

A number of foreign firms operating in Canada have already moved in this direction. For instance, IBM's policy is to establish initial country operations by transferring the manufacture of existing product lines to form a base load for a foreign facility. Additional production is won by a particular facility through bidding for world product mandates. Accordingly, IBM Canada has the world mandate for hardware power supplies, which it sells to other IBM affiliates, as well as niche mandates in software development. Hewlett-Packard Canada, in the same industry, has taken a different approach to the same end. It has built a core business in Canada by acquiring niche companies whose capabilities reflect the particular demands of local conditions. As a result, Hewlett-Packard's Pancom division in Waterloo, Ontario, concentrates on remote terminal units used for recording data in rugged physical environments such as oil fields and hydro transmission lines, and has won the world mandate for OX terminals, remote terminals for workstations. Similarly, Hewlett-Packard's Edmonton-based Idacom division manufactures computer-based protocol analyzers for the worldwide market, and Hewlett-Packard's Calgary operation has the world mandate for supervisory control and data acquisition software, especially for the oil and gas industry.

In rationalizing existing operations, foreign firms should build on existing Canadian advantages. For instance, Campbell Soup is reconfiguring its Canadian operations for a North American manufacturing strategy. Canada is taking responsibility for a series of small batch, specialty product lines best suited to the small yet flexible Canadian plants. Another approach adopted by ICI, after it took full control of its Canadian subsidiary, was to locate the world headquarters and a significant proportion of R&D in Canada for its industrial explosives business. As discussed earlier, the transfer of world mandates in detonators, industrial explosives, and sodium azide to ICI Explosives Canada in part reflected Canada's world-leading position in mining design and safety standards.

Failure to convert subsidiaries into true home bases can have unfortunate implications. Caterpillar's plant in Brampton, Ontario, which produced log skidders and wheel loaders, performed few home base activities in spite of the fact that log skidders were not produced elsewhere within the company's North American operations. With the announced closure of this plant, log skidder production will be put out to contract manufacture, and wheel loader assembly will be transferred to the U.S. Similarly, Varity Corporation, formerly Massey- Ferguson, ceased many years ago to have a home base in Canada for its farm and industrial machinery. It never had a home base for its tractor, diesel engine, or automotive product operations here. The move of the management company's corporate office to Buffalo, New York was merely the final act in a long retreat from Canada.

G. Redefine the Relationship with Government

The relationship between business and government in Canada has too often worked against competitive advantage. Business has often relied too heavily on government to provide protection and support.

Canadian firms must re-evaluate their expectations *of* government and demand new things *from* government. First, they should demand that government activity not substitute for business initiative. Second, some old forms of government help are counterproductive -- subsidies, artificial cost structures, lax regulations, guaranteed procurement, and protection work against, rather than for, long-term competitiveness. Third, government can contribute most in the areas of infrastructure and advanced factor creation. Government-assisted R&D centres and training programs can be significant assets for firms. Firms must apply technical development input from R&D laboratories to the needs of their industries, and should work with governments (as with educational institutions) to ensure commercial relevance. Similarly, a cooperative relationship between business and government increases the likelihood of success of government-funded specialized infrastructure.

Firms can play a key role in influencing government policies that affect their ability to create competitive advantage. They should promote government policies that improve the home diamond in the industry or industries in which they compete. This will require a change in outlook on the part of many companies. Historically, Canadian business has often lobbied for policies such as relaxation of environmental standards, tariff protection, subsidies, and preferential procurement that may yield short-term returns but weaken competitiveness in the long run.

4. IMPLICATIONS FOR LABOUR

With roughly 37 percent of the Canadian labour force unionized, organized labour plays a major role in the Canadian economy and in a host of individual industries (notably in the resource and manufacturing sectors). Unions also exercise influence by adopting strategies and objectives that affect workplace relations in the broader private sector.

The attitudes, policies, and approaches of organized labour can either help or hinder competitiveness. Far-sighted union leaders understand that efforts to boost productivity, upgrade skills, and facilitate shifts into more sophisticated jobs will ensure good wages. They see beyond dividing up a fixed pie and concentrate more on expanding it. Efforts to set wages irrespective of international competition, "preserve" jobs, or freeze past ways of doing things will only hasten failure.

In the old Canadian economic order, a breakdown in labour-management relations generally involved little cost. Large resource and oligopoly rents were there to be divided. Market protection and weak rivalry meant that cost increases could be passed on. Companies could pay little attention to the workforce and still prosper. Giving in to wage demands unconnected to productivity, and to work practices that impeded innovation, was tolerable and expedient.

Those days are rapidly coming to an end, as previous chapters have amply illustrated. A new labour-management paradigm is needed if both sides are to maintain prosperity. This paradigm will require significant attitudinal changes by both management (as discussed above) and labour. For labour, some of the essential features of this new paradigm are the following:

Focus on Productivity. Canadian unions have sometimes been hostile to the imperative of productivity improvement, viewing it as a threat to jobs or as a veiled attempt to reduce wages and benefits. To varying degrees, they have resisted developments geared to achieving higher productivity (for example, technological change, workforce reorganization, multi-skilling), and compensation systems more closely linked to performance. Yet the long-run viability of Canadian firms and industries depends critically on their success in upgrading and increasing productivity. Unions can play a positive role by assisting firms to identify and then remove obstacles to productivity improvement, by pressing for job enhancement and flexibility, and by accepting the need for advancement based on training and merit.

Skills Upgrading. A central goal of labour should be to broaden and increase workers' skills on an ongoing basis. A recent study by the Conference Board of Canada highlighted "a general employee apathy toward upgrading basic generic skills, despite the availability of numerous employer incentives to do so."[2] In an era when average skill requirements are rising rapidly, such complacency jeopardizes the continued prosperity of workers and of the Canadian economy.

In recent years, there have been encouraging signs that some unions have come to accept both the inevitability of technological change and the necessary skills upgrading that accompanies it. Hopefully, this attitude will become more prevalent among Canadian unions. However, most of the onus for developing a "training culture" within Canadian business falls on managers. In the absence of a commitment to training and skills upgrading by managers, it is unrealistic to expect that unions can effect the necessary changes.

More Cooperative Labour-Management Relations. These critical changes suggest a deeper need. Shifts in production technologies and increasing competition demand a reevaluation of the traditional labour-management framework. A more highly collaborative environment is essential. As noted, a large measure of the changes must occur within Canadian management. For their part, unions should embrace opportunities to participate in firm planning, setting aside suspicions of management "infringement". Responsibility for such a shift in thinking begins with the union leadership. In this regard, comments such as that put forward in a recent CAW statement on the reorganization of work are counterproductive: "The truth is that management's agenda is not about surrendering its power, but of finding more sophisticated ways to extend it."[3] If Canadian industry is to compete successfully in the future, labour must move beyond its traditional and deeply rooted inclination to view management as "the opposing team". Indeed, countries such as Switzerland, Germany, and increasingly Japan provide indisputable examples of successful labour-management partnerships.

5. IMPLICATIONS FOR GOVERNMENTS

Both the ten-nation study and our research on Canada have clearly demonstrated that government can improve or detract from national competitive advantage. The question is not whether government should have a role, but what that role should be. The extremes, laissez-faire and heavy intervention in particular industries, have been resoundingly discredited.

Government's role in shaping competitiveness is inherently partial. Its policies will fail unless they work in tandem with other determinants. Government must help create the skills, research infrastructure, and other inputs on which all firms draw. It must also, through such instruments as regulation, tax policy and competition policy, create an environment conducive to upgrading and productivity growth. An important role of government is as a catalyst -- rather than providing a comfortable environment for business, governments should strive to challenge firms to upgrade by providing appropriate pressures. The preferred approach has been demonstrated by the Japanese government, with its national campaigns to boost quality and energy efficiency, its symbolic cooperative research programs in emerging technologies, and its emphasis on providing early demand for new products such as robotics and facsimile machines. In the past, many government policies in Canada have not challenged but rather have lulled industry.

In this section, we discuss the broad implications of our findings for Canadian policymakers. We start by outlining some general principles for sound government policy, and then focus on several specific policy areas in which change is most needed. Our intention is not to be exhaustive or to provide detailed policy recommendations, but rather to signal important areas that warrant attention by decision-makers. We focus in particular on policy issues at the national level; detailed analysis of policies in every province was simply not feasible. Yet the same principles apply to policy at the provincial level, and we will provide some illustrative examples.

A. Some General Principles

Canadian governments should be guided by a limited number of principles as they seek to develop policies to assist Canadian industries and companies achieve international competitive success.

i) Encourage Adjustment and Upgrading

Competitive advantage grows out of dynamism, not static advantage such as cheap labour or subsidized costs. Despite this, government policy often reflects a static mindset. We have seen a number of instances where government policies have impeded the adjustment and upgrading process in various industries and regions. This has usually just prolonged the agony in the face of the inexorable forces of change. Subsidies slow the rate of upgrading. Not only have such policies represented an ineffective use of resources, they can actually make the adjustment process more wrenching than it would be otherwise.

In the next few years, as freer trade and other forces of change increasingly make themselves felt, many industries in Canada will be forced to restructure and refocus. As discussed in the "Implications for Canadian Firms" section, this will often require rationalization of product lines and reduced diversification, involving shifts in emphasis away from some industries and segments and toward others.

The proper focus of governments is to help facilitate adjustment. This will involve a greater government commitment to retraining, to building infrastructure appropriate to changed circumstances, and to providing an environment conducive to restructuring. If adjustment assistance is provided, governments must ensure that finite time limits to aid are clearly established.

Government policy must also promote upgrading, rather than intervene to eliminate the need for it. Across the full range of policy areas -- from regulation, to government procurement, to education -- the emphasis must be on promoting innovation and raising the sophistication of industry.

ii) Minimize Direct Intervention in the Economy

Direct intervention in the economy can have two unfortunate consequences. First, to the extent that expenditures are used ineffectively, scarce resources are wasted. Second, direct government intervention tends to encourage an unhealthy dependence on government by industry. This blunts innovation and slows adjustment.

Governments at all levels should take steps to reduce this cycle of intervention and dependency by putting a renewed emphasis on promoting competitiveness via indirect means. This would encompass policies designed to improve infrastructure and human resources and to foster an appropriate macroeconomic and investment environment.

The temptation to target particular sectors should be avoided. There is little evidence to suggest that governments are well qualified to pick winning sectors or industries. For every success story we found in other countries, there were dozens of failures. Even the apparent successes, such as Airbus Industries in Europe, involved dubious benefit/cost tradeoffs. Direct subsidies also often result in costly mistakes, as the failed history of many Canadian regional development policies attests. Similarly, bailouts of companies and industries address symptoms and not causes of uncompetitiveness, and do nothing to strengthen Canada's long-term competitive capabilities.

iii) Employ Incentives Instead of Grants

Where government involvement is appropriate, that involvement should focus on leveraging private sector participation, particularly in areas such as education, training and technology. Broader incentives that encourage individuals and firms to upgrade skills, or that create advanced factor pools and improved infrastructure, are more effective.

In order to best maximize private sector involvement in policy programs, governments should avoid "block funding" measures such as grants and instead focus on "matching-funds" mechanisms that force firms to invest their own money.

The federal government's recent Green Plan initiative, "Technology for Environmental Solutions" -- designed to help companies develop environmental technologies -- provides a good example. The program, which will cost the federal government $100 million, is expected to generate an additional $150 million in investment by the private sector and other levels of government.[4]

iv) Re-Engineer Social Policies to Better Serve the Economy

In the long run, economic competitiveness and social goals tend to be mutually reinforcing. More productive industries lead to a stronger national economy, which in turn is better able to meet diverse social goals. At the same time, an effective social infrastructure helps to underpin economic success.

Nonetheless, policymakers sometimes face tradeoffs between economic and social imperatives. Even more importantly, the particular design of social programs can have profound and often unrecognized consequences for the economy. In New Zealand, for example, a non-contributory pension scheme reduced savings, while the structure of welfare payments encouraged young people to drop out of school and worked against skills upgrading.

Historically, both the federal and provincial governments in Canada have emphasized social goals while often needlessly compromising competitiveness. A greater balance between the two must be struck if Canada is to create an attractive environment for competitive advantage. Firms have a choice of where to invest and locate; the next few years will see many companies exercising that choice. It is vital, therefore, that new policy initiatives be carefully evaluated according to their impact on regional, provincial, and national competitiveness. Aggregate social spending in Canada is not out of line compared to most other industrialized countries. However, the goal should be to meet social goals at the least possible sacrifice to incentives, upgrading, and productivity growth.

v) Improve Intergovernmental Policy Coordination

We have provided many examples of how federal and provincial policies are working at cross purposes. Employment, education, the environment, and provincial government procurement practices all provide examples of how conflicting policies blunt effectiveness.

Canadians today are paying the high cost of maintaining elaborate bureaucracies at both the federal and provincial levels, yet are not receiving the benefits of either strong central control or effective decentralized decision-making. In the future, all levels of government in Canada must recognize that they have a shared stake in competitiveness. All public sector institutions have a role in influencing areas that bear on competitiveness but which may not lie completely within their respective jurisdictions. Policymakers in a country as diverse and regionally fragmented as Canada must continually remind themselves that prosperity is not a zero-sum game, where one province or region gains only at the expense of others. With greater specialization and economic dynamism, all can benefit. Governments in Canada, therefore, need to avoid traditional parochial considerations and adopt a longer-run view of self-interest.

The ultimate structure of a potentially reformed Canadian confederation is now under active discussion. This is a highly charged subject that lies outside the scope of this study. From the standpoint of economic competitiveness, the precise makeup of the Canadian political structure is less important than ensuring that whatever structure that exists minimizes economic balkanization and militates against the policies that retard productivity and dynamism. Improving Canada's international competitiveness will necessitate a far greater degree of collaboration between the federal and provincial governments than has been the case in the past, as well as much greater collaboration among the provinces.

vi) Maintain an Open Policy toward Foreign Investment

With such a high proportion of foreign ownership in the economy, it is not surprising that Canada has a long history of interventionist policies toward foreign investment. However, the Canadian policy response over time has been somewhat conflicting. Policies have ranged from encouragement of foreign investment to efforts to limit it or to direct it in certain ways.

We strongly believe that efforts to restrict foreign investment in Canada, or to legislate foreign company behaviour should be avoided. Foreign investment, except in rare instances, contributes to Canadian productivity. Other things being equal, foreign companies bring new products, new processes, new assets, and new skills that can boost productivity. A good deal of Canadian evidence supports this view; foreign-owned companies are frequently more efficient and often invest in R&D as much as, or more than, their Canadian counterparts.[5]

Foreign investment should be restricted only if it (1) eliminates effective rivalry in Canada or (2) emanates from a nation with demonstrably unfair trade practices in the industry in question. The first exception reflects the importance of active local rivalry for consumer welfare and for the rate of upgrading in an industry and in related fields. The second exception arises because unfair trade practices may allow less productive firms from an offending nation to prosper, thereby distorting the beneficial role of foreign competition in stimulating productivity growth.

While Canada is better off with foreign investment than without it, the existing pattern of foreign activity in the Canadian economy reflects weaknesses that should be a cause for concern. The issue is not whether foreign firms should be in Canada, but what they choose to do there. Because of weaknesses in the Canadian diamond, foreign activities in Canada are too often limited to sourcing raw materials or performing the minimum functions needed to gain market access. In a world of intensifying international competition, these activities will become increasingly vulnerable.

The challenge, as we have stated, is to transform the Canadian economic environment so that foreign companies will, in their own self-interest, change the nature of their Canadian activities. This will move the Canadian economy to a higher productivity growth plane. Such a transformation will require the wide array of changes in policies, strategies and attitudes throughout the diamond that has been outlined in this chapter.

While attracting foreign investment clearly has not been a policy objective in Canada, governments have, from time to time, provided incentives to foreign companies for specific projects. The danger, however, is that commonly used incentives, such as input subsidies and tax breaks, will attract cost-sensitive investments oriented toward sourcing cheap factors. This approach will, however, ultimately lead to the same risk of relocation or downgrading now facing Canada if a better deal emerges elsewhere. Public sector resources should instead be focused on government investments and corporate incentives that promote upgrading by both foreign and domestic firms -- for example, specialized training, research infrastructure, and specialized industrial infrastructures such as digital telecommunications -- rather than on subsidies that render sophisticated products and processes by the foreign multinational unnecessary. Public resources should be dedicated to the creation of assets that remain in the country and which lead to lasting benefits for a wide cluster of Canadian-based companies, even if the original multinational moves its operations or downgrades them.

vii) Promote a Sound and Stable Macroeconomic Policy Environment to Complement Other Initiatives

Macroeconomic policy has been a preoccupation in Canada, which is true of many other countries as well. Many national governments devote disproportionate attention to inflation, interest rates, and currency values. While a stable macroeconomic environment greatly benefits competitiveness, it does not create or ensure it. Canadian industry has often been tempted to look to currency devaluation as a panacea to bolster international competitiveness. However, there is little international evidence suggesting that devaluation improves the competitiveness of a nation's industries over the long term. Indeed, Sweden's efforts at devaluation simply led to a diminution in the nation's standard of living as exports were sold more cheaply and imports became more expensive. It did little to encourage domestically based firms to upgrade the economy; rather, it had the opposite effect. Devaluation led to pressures for more devaluation. The root cause of Canada's poor cost performance is not found in exchange rate misalignments, but rather in sluggish productivity growth and a lack of upgrading.

Having put macroeconomic policy in context, there is little doubt about its proper goals. A low inflation environment works to lower the real cost of capital, which in turn facilitates investment and upgrading throughout the economy. A high rate of national saving (public and private) generates capital for investment in industry.

One of the most critical macroeconomic issues facing Canada is the size of government deficits and the resulting national debt. In addition to undermining confidence in the economy, chronic public sector deficits and spiralling debt result in either higher inflation or higher interest rates or, most likely, a combination of the two. It is imperative that determined action be taken to reduce government deficits and slow the rise of public debt in Canada.

The economic instability fueled by the state of public finances in Canada is working against competitiveness. With governments appropriating a significant portion of domestic savings, foreign indebtedness has been rising sharply. The current account deficit (approximately $20 billion) has become unsustainably large. While most evidence suggests that Canadian firms have not been severely penalized by high real capital costs over the past decade (at least compared to their U.S. and U.K. competitors), the real cost of funds in Canada has moved substantially above the U.S. level in recent years -- and the U.S. level itself is quite high by international standards. In addition, the Canadian dollar is currently valued above its purchasing power parity (PPP) rate. If these conditions persist, investment and productivity growth will be undermined.

B. Priorities in Specific Policy Areas

There are numerous government policies that affect competitiveness, and we cannot address all of them here. Rather, we will highlight some specific priorities for improvement in each part of the Canadian diamond. These are areas that emerged from our research as significant problems and are among the most central constraints to future productivity growth. Our discussion in earlier chapters should suggest many more areas for improvement as well.

Factor Conditions

Because Canadian competitiveness has been mainly rooted in factor advantages, government policies bearing on factor conditions are particularly important.

i) Investment in Education and Specialized Skills Upgrading

As noted in Chapter 6, upgrading human capital will be critical to Canadian firms' ability to become more competitive. Canada has a relatively well-educated workforce and population, but its education and training systems have failed to respond adequately to the challenges posed by the contemporary global economy. Ensuring that the education system does a better job of imparting basic skills is one priority. Improving and expanding private sector training systems is another, since it is expected that the requirements for skills upgrading in Canada will increase significantly over the next decade. As this occurs, it will be particularly important to have mechanisms in place to retrain existing workers. A number of initiatives could be undertaken to accomplish this.

- *Provide more training for the unemployed.* Canada's expenditures on training as a percent of its total labour market program expenditures rank among the lowest of the nations we have studied, as does training participation among the unemployed. This stands in sharp contrast to nations such as Sweden, which links unemployment payments to participation in training and retraining programs. Recent federal government initiatives to redeploy funding toward training are a positive step, but only represent a beginning. Shifting from passive income support to active measures that encourage adjustment promises to have a positive impact on economic upgrading and will also improve the skills and employability of unemployed workers themselves.

- *Promote more participation by firms in training and apprenticeship programs.* Canadian firms in general spend significantly less on workforce training than firms in many other countries. The establishment of a Canadian Labour Force Development Board, similar provincial boards, and industry-oriented bodies concerned with training and skill development are all positive steps. It may be necessary, however, for governments to go further in providing appropriate incentives to encourage private sector expenditures on employee training and apprenticeship programs. One option might be to provide these incentives through the form of UI premium rebates for firms that undertake training (possibly targeted at small and mid-size firms). Another might be to provide limited tax exemptions or credits in respect of specific kinds of training activities. Industry associations provide another conduit through which governments can work to encourage firm involvement.

- *Set high national educational standards.* Canada's generous spending on education has not translated into impressive international test results, and functional illiteracy remains a significant problem. Canada is nearly alone among developed nations in having no national education standards. In other countries, such standards are an important ingredient in fostering high achievement. It is important to note that national standards are not inconsistent with a decentralized educational system. In Germany, for instance, national standards coexist easily with a Laender- or state-administered education system. A national standard need not require a full-fledged national system for testing, provided an appropriate level of intergovernmental cooperation exists. Provincial governments should move quickly to collaborate in developing agreed standards and testing mechanisms.

- *Place more emphasis on practical curricula and science skills that meet the needs of industry.* Relative to other nations studied, Canada has relatively few research scientists, engineers and technical workers in its labour force. While there is little evidence that supply and demand are currently out of balance, the demand for scientists and engineers in Canada reflects an old order that is rapidly disappearing. The failure to produce significant numbers of scientists and engineers is likely to represent an important barrier to upgrading the economy in the future. What is particularly worrisome is evidence of a declining interest in the sciences among elementary and high school students. Statistics also point to declining enrollment in trade and vocational programs and flat or falling enrollment in community colleges, which are the main providers of technology-oriented postsecondary programs. School curricula should be redesigned to put more emphasis on science, mathematics and technology disciplines.

- *Expand apprenticeship programs and update their curricula.* Our research, and that of other organizations such as the Premier's Council of Ontario, indicates that many apprenticeship programs are outdated, suffer from restricted access and lack of standardized certification criteria, and are plagued by high dropout rates. Limited access is primarily due to the absence of any kind of formalized system to allow young people to make the transition from high school to apprenticeable occupations. Lack of well-recognized certification procedures has hampered the development of apprenticeship programs. In some occupations, shorter programs (one or perhaps two years) would make more sense than the much lengthier programs that have traditionally existed. Cooperative action on the part of business, government, labour and colleges is urgently needed to ensure these programs are updated and expanded into more occupations. Mechanisms must be developed to ensure that apprenticeship programs are modified on an ongoing basis, in accordance with evolving industry requirements.

- *Work more closely with trade associations.* As discussed above in "Implications for Firms", trade associations represent a potentially high leverage mechanism for upgrading Canadian factors, particularly in the areas of education and training. Governments at all levels therefore must align themselves to work more closely with these associations.

- *Promote more extensive co-op program participation.* Cooperative education programs have proven to be an excellent vehicle for linking school and the workplace and for facilitating the transition from formal education to the labour force. Governments have already made significant progress in promoting co-op programs, mainly in the applied sciences. The focus now should be on broadening participation in these programs (including participation by social science and arts students at universities and colleges).

- *Align university funding to support competitiveness.* As currently structured, government funding mechanisms to universities may not adequately underwrite the cost differentials that exist between arts courses and science- and technology-related courses, which typically require greater resources. The rapid aging of university physical plants also disproportionately hurts science and engineering courses. Governments may have to reevaluate these funding mechanisms to ensure Canada has the capabilities to continue to deliver high-quality postsecondary education in the sciences. Also required is a reexamination of the appropriate role of tuition in the overall funding mix and the potential for school autonomy in setting tuition fees. The privatization of some programs or even institutions should be seriously considered.

II) More Focused Technology Development and Faster Adoption

Both technology development and its adoption are significant problems in Canada. The problem lies more with the private sector than with government, however. Government civil R&D spending in Canada is in line with that of other nations as a percentage of GDP, and R&D tax incentives are among the most generous in the world. There is little reason to believe that a significant increase is needed in government's total R&D spending. The emphasis should instead be on ensuring greater leverage and effectiveness in government programs. While the federal government's InnovAction program has been a step in the right direction, more progress can be made at both the federal and provincial levels.

- *Increase the proportion of government R&D funds performed in the private sector.* While government R&D spending has increasingly emphasized private sector and university performance, federal laboratories still accounted for 55 percent of federal government expenditures of $2.7 billion in 1990, while provincial laboratories accounted for 41% of provincial government expenditures of $664 million. Given the funding issues which currently exist within the university system in terms of science and technology infrastructure, as well as the inherent issues of ensuring commercial relevance and technology diffusion associated with government labs, we believe governments at the federal and provincial levels should continue to reduce the proportion of their funds spent internally, in addition to increasing the linkages with industry of the activities that remain. While clearly there will continue to be a role for government labs, which have had notable successes in a number of areas, the approach should be to contract out wherever it is feasible.

- *Improve Coordination of government R&D programs.* Our analysis revealed a number of areas where excessively fragmented government expenditures limit the effectiveness of programs. Duplication of research between universities and government laboratories is also of concern, especially given the scarcity of government financial resources today. This problem is exacerbated by the fact that science and technology policy is an area of shared jurisdiction in Canada. Expenditures and research efforts in federal and provincial government research organizations must be far better coordinated and tied more closely to university research activities. For example, in the Atlantic fishery industry there are no fewer than 18 different institutions supported by the federal and/or provincial governments, resulting in a significant duplication of scientific research. Each government-supported research program should be examined in order to consolidate and rationalize where appropriate.

- *Forge stronger links among government laboratories, provincial research organizations, universities, and the private sector.* Government policy on science and technology has attached a high priority to advancing science and to training qualified personnel. In general, however, private sector participation in government R&D activities has not been well leveraged. The government should make it a priority to generate more intimate linkages with industry in order to ensure both maximum commercial relevance and rapid technology transfer.

- *Encourage greater specialization among universities.* Current government policies and funding mechanisms often discourage specialization among Canadian universities -- a problem aggravated by generally weak linkages between universities and industry. To create the specialized skills and other advanced factors necessary to achieve competitive advantage, more specialization in university programs and research activities should be encouraged.

- *Expand information available on intellectual property.* As investments in science and technology resources become increasingly important, governments must strike a delicate balance between ensuring that appropriate incentives exist for firms to undertake these investments -- facilitated by strong IP protection -- and ensuring that these IP laws, as well as the information infrastructure that supports them, promote a strong degree of technology diffusion.

Revisions to Canada's Patent Act in 1987, which increased patent life in line with most other developed nations, have been a positive step, but Canada continues to lag behind several international competitors in the automation of the patent search process, a key ingredient in promoting diffusion of technology. In particular, this makes it more difficult for small- and medium-sized firms to gain access to new technologies. Completing the planned automation program should therefore be a high priority for the federal government.

iii) Increase the Pace of Regulatory Reform in Infrastructure Sectors

The lagging pace of deregulation in Canada compared to the U.S. has resulted in higher service costs to Canadian producers in some sectors. Moreover, the pace and process by which changes have evolved have often created an environment characterized by a high degree of uncertainty.

Canada needs a more cohesive surface transportation policy. Although the 1987 revisions to the National Transportation Act cleared the way for more competition between modes of transport, it stopped short of eliminating the plethora of direct and indirect subsidies that currently distort the Canadian transport sector.

Poor coordination of government policies has also constrained the productivity growth of the Canadian transportation and communications industries and, more importantly, harmed the competitiveness of the large number of other industries that rely on them. The provincial and federal governments must continue to work toward closer harmonization of policies that restrict interprovincial competition and rationalization. Variations in trucking industry standards are an example of the negative impact of poor coordination between jurisdictions in the area of infrastructure services.

iv) Strengthen Resource Conservation and Renewal Policies

Effective natural resource conservation practices are vital to sustaining the competitiveness of a resource-based economy. Canada's record to date has been mixed. In a number of sectors, Canadian practices lag behind the best practices of other nations, though in general the trend has recently been toward better stewardship.

With close to 50 percent of exports dependent on natural resources, Canadian governments must ensure that policies promote long-term conservation, not short-term exploitation. One positive example is the West Coast salmon industry which has a well-developed stock enhancement program that is administered by the federal Department of Fisheries and Oceans in close collaboration with provincial and industry participants. The federal government's forest replantation program is another example of a successful conservation initiative. Resource management programs in all resource sectors should be evaluated against long-term conservation criteria.

Demand Conditions

Governments have a significant impact on a nation's home demand conditions in a number of ways, particularly through government procurement policies, regulation of product safety, product standards and environmental standards. The proper aim of government policy in these areas is to encourage home demand that is early, sophisticated, and anticipates needs in other countries. Such an approach stimulates new business formation, innovation, and success in export markets. Canada's record in influencing home demand is not a strong one. The tendency has been to retard innovation rather than stimulate it.

i) Restructure Government Procurement

The effectiveness of government procurement policy in spurring innovation in Canada has been undermined by several factors -- blurred policy objectives, short-term planning horizons, restrictions on out-of-province bidding, and a preference for off-the-shelf products. Governments have rarely acted as a sophisticated buyer in purchasing, pressured Canadian companies to upgrade, or created an early market for new products. Canada is not alone in its failure to employ procurement as a tool to upgrade the economy. Many nations would receive similar grades. Yet nations such as Sweden and Singapore have benefited greatly from innovative procurement, and demonstrate that a higher standard is achievable. While some progress in reforming procurement practices has been made in recent years, particularly at the federal level and in Quebec, more must be done.

- *Encourage more open competition for government contracts.* Discriminatory purchasing practices, especially at the provincial level, have historically carried significant economic costs. Governments at all levels must strive to ensure competition is open to out-of-province and out-of-country competitors.

- *Use challenging performance specifications wherever possible.* As we have discussed, the use of "make-to-blueprint" design specifications still appears to be widespread in government procurement. Instead, governments should move strongly toward the use of performance-based specifications wherever possible, in order to encourage suppliers to develop and proliferate innovative products and processes.

ii) Adopt More Stringent and Forward-looking Regulatory Standards

Strict, anticipatory regulatory standards can be a potent force for encouraging upgrading in industry, provided they are designed and administered effectively. Stringent product quality and safety standards pressure firms to improve products in ways that are welcomed not only at home but in global markets. Sweden's tough standards for product safety, for example, have been important sources of competitive advantage in products such as cars, trucks, seatbelts, and many others. Regulatory standards in areas such as construction, telecommunications, and transportation can stimulate early and sophisticated home demand. For example, Japan's early moves to allow facsimile machines to be hooked to ordinary telephone lines, and to sanction facsimile transmissions as legal documents, were crucial to the early expansion of the Japanese market and to Japan's ultimate success. Tough standards for energy efficiency and environmental impact trigger innovations in products and processes that are highly valued elsewhere.

In Canada, environmental standards have historically lagged behind the pace set by other leading industrial nations. Other regulatory standards have generally been relatively strong, particularly in the area of product safety, but there is room for improvement. In addition, enforcement and administrative standards in both areas have been complicated by the jurisdictional overlap between the federal and provincial governments.

In the environmental area, the proposed federal Green Plan, when implemented, promises to make significant strides in a number of areas including greater use of more holistic "cradle-to-grave" regulations and performance standards, the use of market instruments to encourage innovation and institute a more predictable regulatory framework. It is important to note that the effective implementation of forward- looking standards will require a significantly greater degree of harmonization among different levels of government as well as more consistent administration.

Related and Supporting Industries

As we have discussed, the presence of home-based related and supporting industries is a critical ingredient in stimulating and facilitating innovation and productivity growth. The quick and constant interchange of information, ideas and know-how creates powerful spillover benefits that speed progress.

i) Ensure Programs in All Policy Areas are Consistent with the Development of Clusters

For Canada, the lack of depth or breadth in even its most successful clusters (such as forest products) is a significant cause for concern as the entire nation and regions within it attempt to respond to a new competitive environment. While growth of strong clusters must occur organically as a result of positive changes in all determinants within the diamond, government policies can have an important role in either enhancing or impeding cluster development in a region.

In particular, a recurring theme of our examination of government industrial and regional policies in Canada was the attempt, by all levels of government, to promote equalization of economic diversity in various regions of the country. Unfortunately, many of these ventures into unrelated diversification have been unsuccessful.

This spotty record should not be surprising given an understanding of the diamond: success must be driven by multiple factors, and many of these efforts were in industries wholly unrelated to regional strengths, particularly in the areas of factor conditions and related and supporting industries. The distortions caused by these unrelated regional diversification efforts can be found in a number of policy areas including procurement, educational funding, and science and technology policies.

International experience further reinforces the importance of focusing regional policies on regional strengths. In Italy, for example, decades-long attempts to develop southern Italy have largely met with failure. As in Canada, these policies were often based on building large-scale operations in areas with few linkages to the local economy, in the hope of attracting other firms and industries to locate nearby.

While upgrading regional economies and broadening the base of industries is an appropriate policy goal, it is critical that this be done in a manner that maximizes policy effectiveness.

- *Build on regional strengths.* The presence of an industry or cluster in a region is generally a sign of some advantage that exists. Development policies should therefore focus on enhancing clusters by building increased breadth or depth, rather than subsidizing existing inefficiencies or trying to build industries unrelated to regional strengths. As an example, the Atlantic fisheries industry presents large opportunities to increase efficiency and to build greater breadth and even depth in the cluster but this will require a significant change in approach on the part of federal, and particularly provincial, policymakers.
- *Focus on promoting development of specialized factors.* The most effective way for governments to reinforce cluster development is to focus on investments that create or help to create specialized factors such as university technical institutes, training centres and specialized infrastructure. Importantly, many of these policies must originate at a provincial and even local level. In Germany, for example, local governments are often actively involved in supporting educational institutions tied to local clusters. Even in the U.S., areas such as Research Triangle in North Carolina, provide examples of state and local efforts to support clusters. Focusing on specialized factors is also useful in ensuring that the maximum number of related industries can upgrade since the interconnectedness of industries means that related industries must be developing in parallel for maximum cluster development to occur.

Strategy, Structure, and Rivalry

Governments can strengthen the competitiveness of their industries by fostering a stable economic environment and creating incentives for investment, skill upgrading and risk-taking, and by ensuring that a healthy degree of competition prevails in the home market.

I) Create Stronger Individual and Corporate Incentives for Investment and Upgrading

Through tax policy and its actions in other policy areas, government has a role in shaping the incentives of individuals to work, save and invest in skill building. Governments and firms must develop policies and strategies to ensure that goals of individuals and firms are consistent with fostering competitiveness. The following initiatives should be considered:

- *Re-engineer "safety net" programs to ensure that they are well targeted to those in need and provide appropriate incentives to upgrade skills and reenter the workforce.* As we have seen, the structure of some government programs creates disincentives for beneficiaries to find work or upgrade skills. These programs should be restructured so that clear incentives always exist for individuals to work -- for example, by allowing social assistance recipients to keep a greater portion of earnings from employment.

- *Encourage stronger linkages between performance and compensation.* Currently, Canada lags a number of competitor nations in linking compensation to performance (either productivity or firm performance) at both the managerial and worker levels. Governments can assist in encouraging compensation linked to performance, both by moving to this standard wherever possible within the civil service, and by facilitating this trend in the private sector. One possible method for achieving this would be to provide further incentives for employees to invest in their companies. Despite some positive provisions (such as preferential stock option treatment for small businesses), current Canadian tax policies could be revised to provide greater incentives for employees to buy and hold shares in their companies. In the U.S., Employees Stock Ownership Plans (ESOPs) are afforded significantly more favourable tax treatment (along with incentives for lenders) than is available in Canada.

- *Provide more favourable tax treatment for long-term equity investment.* For Canada to increase its world competitiveness will require high levels of investment in training, technology, machinery, and equipment. Yet the payoff from such investments is often realized only over the long term. There is a concern in Canada (and the United States) that investors -- individuals, corporate and institutional -- are often guided by a shorter-term outlook. This comes at a time when personal savings rates have declined from 14.6 percent in 1983 to approximately ten percent in 1990,6 and when governments continue to borrow most domestic savings. While tax treatment of capital gains is currently slightly more favourable in Canada than in the U.S., this is largely offset by higher marginal tax rates. In addition, a number of other nations surveyed have adopted measures designed to encourage long-term investment. Consideration should be given to restructuring capital gains taxation in Canada to provide increased incentives (that is, lower tax rates) for long-term (greater than two to three years) investments in companies and productive assets.

ii) Extend Efforts to Increase Rivalry

Canadian governments have made significant strides in recent years toward instituting policies designed to enhance domestic rivalry. Freer trade, deregulation, and modernization of competition laws all represent steps in the right direction.

As we have seen, however, non-tariff barriers among provinces continue to have a deleterious effect on rivalry and on Canada's international competitiveness. All governments need to cooperate in order to eliminate these barriers as quickly as possible. Significantly, this issue was highlighted in the May 1991 federal Throne Speech which called for the elimination of these barriers by 1995 -- something that is also a key focus of the federal government's recent statement, *Canadian Federalism and Economic Union*. A strong commitment by provincial governments to assist in realizing this goal is essential and long overdue.

iii) Move Aggressively to Restore a Favourable Macroeconomic Environment

All levels of government in Canada must share in the burden of bringing deficits and debt under much better control. The necessity for much lower deficits in the 1990s means that both federal and provincial governments will need to reevaluate their spending programs with the goal of significantly increasing the effectiveness of dollars spent. The underlying philosophy of the federal government's recent proposals for economic reform, which calls for increased fiscal coordination among the federal government and the provinces, is a sound one and the proposals deserve serious consideration.

Finally, despite recent proposals by some, devaluing Canada's currency is not a long term solution to underlying competitiveness problems. It would be an unsound policy with adverse longer term consequences even if it might temporarily improve the competitive position of some Canadian industries.

6. IMPLICATIONS FOR CANADIAN CITIZENS

In this study we have endeavoured to provide hard empirical support for our findings about the state of Canada's competitiveness and the needed changes. It is ironic, therefore, that perhaps the most important factor in Canada's ability to move forward is the attitudes and the mindset of individual Canadians. Unless individual citizens can accept and internalize the new reality, positive progress will be undermined.

Canadians must understand the foundations of their past prosperity, and the fact that the comfortable old order is disintegrating. They must also recognize that the sources of Canadian competitiveness are at risk. Most importantly, Canadians must understand that they cannot return to the old order.

Instead of looking longingly at the past, Canadians must adopt the new paradigm for what will determine future Canadian competitiveness. They must respond to this new paradigm in their roles as employees, as managers, as voters and as members of their communities.

7. CONCLUSION

Canada today faces unprecedented challenges to its future economic viability and prosperity. The traditional Canadian economic order, developed over many decades, generally worked well for most Canadian. Now, however, it is under tremendous strain because of sweeping changes in the global competitive environment -- rapid growth of trade and investments, more open competition, the globalization of industries, shifting corporate strategies, rapid technological change, and increased economic integration among countries. The traditional Canadian economic order is less and less able to maintain the high standard of living to which Canadians have become accustomed. While Canadian government, firms and other constituencies have made some efforts to respond to the new competitive reality created by these development, the responses so far are unlikely to be sufficient to promote long-term growth and competitiveness.

There is no going back. The forces of change in the world economy are inexorable, and will not be undone by such steps as abrogating the Canada-U.S. Free Trade Agreement, as, unfortunately, some observers have recommended. The political costs of attempting to wall off Canada from the world economy will also be intolerable.

No simple solutions exist to the competitiveness issues confronting Canada. New competitive realities call for a new paradigm of competitiveness, one that is centrally focused on fostering more dynamism in the Canadian economy. In business, labour and the public sector, new approaches are necessary to create the pressures, incentives and capabilities that will support innovation. The magnitude of the changes affecting Canada's economic environment means that Canadians need to achieve a broad understanding of the issue of competitiveness and work to forge a consensus for action. The needed changes will require years, some even decades. Canadians should not seek quick fixes or accept anything less than real solutions. The emerging national debate on competitiveness provides a welcome opportunity to seek such a consensus.

As its responds to a different and more demanding economic environment, Canada is able to draw upon many strengths. These include a talented and relatively youthful population, a nucleus of internationally successful firms, the opportunities afforded by proximity to the enormous United States market, and a legacy of past achievements in many fields. These strengths, if complemented by a clearer understanding of the true underpinnings of competitiveness, should allow Canada to successfully tackle the task of building a more innovative and competitive economy for the future.

APPENDIX

FIGURE A

CLUSTERS OF INTERNATIONALLY COMPETITIVE CANADIAN INDUSTRIES, 1989

	MATERIALS/METALS			FOREST PRODUCTS	
Primary Goods	Iron and Steel U,I,H,L,T Sect.<80mm, iron Flat. iron, 600 x4.75+mm, coils Flat. iron, 600 x1–3mm, coils Wire, iron, 0.25–0.60%carb Fl. other iron, 600x<4.75mm Lead bar, rod, profls.wire Other angles, etc.hot-rolled Bar, rod, free–cutting steel Flat.iron 600+mm, other pltd Bar,rod,free–cutting steel Fl.other iron, <600x4.75+mm Semi fin.iron,etc. 0.25%+c Fl.other iron,<600mm Wire, iron, <0.25% carbon Bar, rod, iron, <.60%carbon Bar,rod, other alloy steel Flat. iron,600x<4.75mm, cls **ALLOY PIG IRON, ETC.** **HOLLOW DRILL BAR, ROD,STL** **POWDERS,PIG IRON,ETC.** *Bar,rod,iron, .60%+carbon* Ferro–manganese, 2%+carbon	Fabricated Iron and Steel *Other welded,non–circular tube* Non-Ferrous Metals Zinc alloys Zinc dust, powders, flakes **ZINC, NOT ALLOYED** Refined copper bars, etc. **REFINED COPPER** **ALUMINUM, NOT ALLOYED** **ALUMINUM ALLOYS** *Silver unwrought* Nickel alloys **NICKEL POWDER, FLAKES** **REFINED LEAD, UNWROUGHT** *Platinum, alloys, unwrought* Tin foil <.2mm. powders, flakes	Metal Manufactures *Articles of lead, nes* *Articles of nickel, nes* Aluminum wire Reservoir, etc. aluminum *Springs, leaves, iron, steel* *Nails, tracks, etc. iron, steel* Waste and Scrap Tin waste and scrap Magnesium waste, scrap Germanium, articles wst,scp. *Aluminum waste, scrap* Waste, stainless steel **GRANULATED SLAG** **COBALT, UNWROUGHT, WST, SCP** *Cadmium, unwrought, waste, scrap* **NICKEL WASTE AND SCRAP** *Waste, scrap, prec.metal nes* *Platinum, waste scrap* *Cermets, articles, waste, scrap* Other base metal, unwrt, waste Other **ASBESTOS** **PEAT** *Articles of peat*	Wood Products **WOOD, CONIFER, SAWN** Wood, conifer, rough, untreated *Wood rough painted, prsvd.* **WOOD, CONIF, WORKED,SHAPED** **WOOD CHIPS, CONIF.** Wood chips, non–conifer. Hoopwood; split poles; etc. *Plywood, soley wood, other* *Fibrebd, dens0.5–.8g/cm3* *Non–conifer. veneer, etc.* *Coniferous, veneer, etc.* *Particle board, etc. wood* Casks, barrels, etc. staves *Other articles of wood* **SHINGLES AND SHAKES** Paper **NEWSPRINT, ROLLS, SHEETS** *Other paper, brd, 40–150g/m2* **OTHER PAPER, BRD, UN-COAT. NES** *Sack kraft paper, uncoated* Kraft paper, unct<150g/m2 *Semi–chem. fluting paper*	Toilet tissue stock, etc. **PAPER,PAPERBD, TARRED, ETC.** Gummed paper, strip, rolls Filter paper, paperboard Pulp **CHEM.WOOD, PULP, CONF. BLEACHED** **CHEM. WOOD, PULP, SULP. BLEACHED** *Chem. wood, pulp, dissolvng* *Chem. wood pulp, n–conif,b* **CHEM. WOOD PULP, SULP. UNBLEACHED** *Chem. wood pulp, conifer* **SEMI-CHEM. WOOD PULP** **MECHANICAL WOOD PULP** Waste *Waste, paper (newsprint)* *Sawdust, wood waste, scrap* Wood-based Chemical Products *Residual lyes from wood pulp*
Machinery	*Rock cutters,tunneling machinery* Elevator, underground use			**CHAIN SAW BLADES** *Cellulose pulp mfg. machinery*	
Specialty Inputs	**MICA, MICA WASTE** **FELSPAR** *Molybdenum ore etc. roast* *Molybdenum ore etc.,other* **NIOBIUM, TANTALUM, VANADIUM** *Fluorspar* Iron pyrites, unroasted **IRON ORE AGGLOMERATES**	*Iron ore, conctr. not agglomerated* Dolomite **CRUDE, UNREFINED SULPHUR** **NICKEL MATTES** **COPPER ORES, CONCENTRATES** **COPPER MATTES** **ZINC ORES, CONCENTRATES** **NONMONETARY GOLD, UNWROUGHT, SEMIFINISHED**	Tin ores, concentrates Cobalt ores, concentrates Base metal ore, concentrates nes **LEAD ORES, CONCENTRATES** **SILVER ORES, CONCENTRATES** **OTHER PREC. METAL ORE, CONCENTRATES** *Bituminous coal, not agglomerated* *Lignite, agglomerated*	**CHLORINE**	
Services	**GEOPHYSICAL CONTRACTING*****				

Key

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FIGURE A

CLUSTERS OF INTERNATIONALLY COMPETITIVE CANADIAN INDUSTRIES, 1989

	PETROLEUM/CHEMICALS	SEMICONDUCTORS/ COMPUTERS	
Primary Goods	Organic Chemicals Propyl, isopropyl alcohol Thiuram sulphides Acyclic hydrocarbons, nes Oxirane (ethylene oxide) Oleic, linoleic acids, etc. *Ethylene, etc., liquified* *Ethylene glycol* *Styrene* Xylenes, pure Benzene, pure Toluene, pure Propene (propylene) Vinyl chloride *1.2–Dichloroethane* **METHANOL (METHYL ALCOHOL)** **SATRD ACYCLIC HYDROCARB** **PENTAERYTHRITOL** Inorganic Chemicals Carbon nes, carbon black Hydrg. nitr. oxyg. rare gas **SELENIUM, PHOSPHORUS** **AMMONIA, ANHYDROUS, ETC.** *Hydrochloric acid* *Sulphuric acid; oleum* **OTHER INORGANIC ACIDS** Sodium chloride, etc. **CHLORATES OF SODIUM** *Sodium sulphates* *Sodium sulphide* Sodium hydroxide, liquid Calcium, strontium, barium **CALCIUM CHLORIDE** *Calcium carbide* *Cobalt oxides, hydroxides* **SULPHUR DIOXIDE** **ZINC OXIDE; ZINC PEROXIDE** Titanium oxides *Carbides, excldng. calcium* Supprt. catalyst, pr. metal Potassium hydroxide etc. Other chlords, bromds, iodid **ARTIFICIAL CORUNDUM** Petroleum Products *Crude petroleum* **NATURAL GAS, GASEOUS** **BUTANES, LIQUIFIED** **PROPANE, LIQUIFIED** **OTHER LIGHT PETROLEUM OILS** Plastics *Polyethylene s.g.<0.94* Monofilament, vinyl chlrd Ethyl-vinyl acet. copolymer Alginic acid, salts, ester Fabricated Plastics Plastic sacks, bags Other tubes, pipes hoses	Analog or hybrid computer	
Machinery			
Specialty Inputs			
Services			

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FIGURE A

CLUSTERS OF INTERNATIONALLY COMPETITIVE CANADIAN INDUSTRIES, 1989

	MULTIPLE BUSINESS	TRANSPORTATION			POWER GENERATION AND DISTRIBUTION
Primary Goods	Instruments *Other optical radiation instruments* Demonstration instrument Gas meters Other Anvil; port. forged; ground wheel Files, rasp, similar tools **FLYWHEELS AND PULLEYS** Illuminated signs etc.	Vehicles **DIESEL-ELECT. LOCOMOTIVES** *Rail, tram. freight cars* **FLIGHT SIMULATORS, ETC. PARTS** *Aircraft, ULW 2001-15000 KG* *Helicopters, ULW <=2000kg* Helicopters, ULW >2000 kg **GOODS VEHICLES, NES** *Road tractor, semitrailer* Passenger transport vehicles Pub-transport, diesel engines **OTHER PUB-TRANSPORT VEHICLES** *Snow vehicle, golf cars etc* *Snow-ploughs, -blowers*	Vehicle Equipment Solid tyre, interch. tread *Tyres, pneum. new aircraft* *Bodies, tractor, trnsp.vehicle* Navigational instruments **MOTOR VEHICLE SEATS** Materials Handling Equipment *Other vehicle jacks, hoists* Other winches; capstans Construction Equipment S-plropld. construction, mining mch Other const & mining mch not prp *Graders and levellers*	Engines **TURBO-PROPELLER ENGINES** *IC. piston engines >1000 cc* Other than turbo-jet engines	Parts, nuclear reactors Parts, hydraulic turbine, etc *Parts, steam, gener. boiler* *Electric energy*
Machinery	Other brazing, soldering machines	*Injection molds for rubber*			
Specialty Inputs	**MILLSTONES ETC. F. MILLING** *Abrasive, on paper base* Abrasive, other base	Rubber Goods **ISOBUTENE-ISOPRENE RUBBER** *Vulc. cellular rubber, etc.* *Reclaimed unhardnd rubber* *Rubber compound, carb. black* Rubber tube, reinfd. textile Acrylonitrl-butad. rubber Butadiene Rubber (BR)	Parts Bull-, angledozer blades *Intake air filters IC. engine* *Laminated safety glass* **BUMPERS, PARTS TRACTOR, ETC.** **OTHER FITTINGS ETC. VEHICLES** *Parts, rail locomotive. etc.* *Other parts, vehicle bodies* *Brakes, servo-brakes part* Under-carriages, parts Parts, navigational instruments Other parts aeroplanes etc.	Other Tyre cord fabricated nylon etc. Anti-knock preparations	**NATURAL URANIUM ETC.** **URANIUM DEPLETED, ETC.** *Uranium ore, concentrates* *Radio-active material nes*
Services	*Consulting engineering**** Life insurance***	Transit management and design consulting***			

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FIGURE A

CLUSTERS OF INTERNATIONALLY COMPETITIVE CANADIAN INDUSTRIES, 1989

	OFFICE	TELECOMMUNICATIONS	DEFENSE		
Primary Goods	**ACCOUNTING MACHINES** Printed matter, nes *Office furniture, metal* *Office furniture of wood* *Business forms**	Parts, line telephony equipment *Central office switches**	PROPELLENT POWDERS		
Machinery					
Specialty Inputs					
Services					

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FIGURE A

CLUSTERS OF INTERNATIONALLY COMPETITIVE CANADIAN INDUSTRIES, 1989

	FOOD/BEVERAGES
Primary Goods	Basic Foods **CRUSTACEANS, NOT FROZEN** *Other crustacea, frozen* Salmon, fresh, chilled *Salmon, frozen ex.roe* *Other fish, frozen ex. roe* Other fish, fresh, chilled ex. roe Herr. sard., fh, chilled ex.roe Cod, fresh, chilled ex. roe *Cod, frozen ex. roe* Flat fish, fh, chilled ex. roe Fish, livers, roes, frozen **FISH MEAT EX. FILLET FRZN** **FISH FILLETS, ETC. FRESH CHILLED** *Fish fillets, frozen* **OTHER FISH, SALTED** *Other molluscs, fresh, chilled* *Other molluscs, frozen, dry, salted* **MAPLE SUGAR, MAPLE SYRUP** **OTHER FRUCTOSE** **GLUCOSE, 20%–50% FRUCTOSE** **LENTILS, DRIED, SHELLED** **MEAT OF HORSES, MULES, ETC.** **NATURAL HONEY** Maize (corn) starch *Sweet corn, frozen* *Other fruit, nuts, frozen* *Beans, ex.broad, hrs. dry, shelled* *Other veg. unpickled, frozen* *Bovine animals, pure, breeding* *Other bovine animals* Poultry, live, to 185g Egg albumin Egg, unshelled; yolks, dried Ed. offal sheep, horse, frozen **EDIBLE OFFAL, SWINE, FH, CH** Edible ottal, swine, frozen Potatoes, fresh, chilled Potatoes, unpickled, frozen Malt, including malt flour Swine, pure, for breeding *Other live swine* Swine meat, fresh, chilled Meat of swine, frozen Processed Foods **FISH LIVER, ROE, DRD, SMKD.** *Crustacea, prpd, prsvd, nes* Fish, smoked **SALMON, WHL. PCS, PRPD, PRESERVED** **FILLETS, DRIED, SALTED** **COD, SALTED** Other cocoa prep. over 2kg Peas, dried, shelled Sweet corn, prepared, presvrd Other bread, baked goods Toasted bread, etc. *Mustard* *Other meat, offal flour* *Homogenized cooked fruit* Other rolled, flaked grains *Bellies (streaky)* Edible Oils *Rape, colza etc. oil, refined* Rape, colza etc. oil, crude Linseed oil, crude Fats other animals, etc. Beverages Beer etc. made from malt *Whisky*** **COMPOUND ALCOHOL. PREPARATION** *Tomato juice* Mixture, fruit, veg. juices
Machinery	Agricultural Equipment **CULTIVATORS, WEEDERS, ETC.** *Other agric. etc. machinery* *Ploughs* *Seeders, planters etc.* Other soil prep. machinery etc. *Parts, soil prep. machinery* Dryers, agricultural products Poultry–keeping machinery
Specialty Inputs	Agricultural Chemicals *Urea* Urea, ammonium, nitrate mix *Ammonium nitrate* *Ammonium sulphate* *Mono–, Diammonium phosphate* **POTASSIUM CHLORIDE** **POTASSIC FERTILIZERS, NES** Cereals / Seeds, Etc. **DURUM WHEAT, UNMILLED** *Barley unmilled* **BUCKWHEAT, UNMILLED** *Oth. wheat, meslin, unmilled* **OATS, UNMILLED** **UNMILLED RYE** Cereals, unmilled, nes *Groats, meal othr. cereals* **RAPE OR COLZA SEEDS** **OIL–CAKE, RAPE, COLZA SEEDS** **LINSEEDS** **MUSTARD SEEDS** **CANARY SEEDS, UNMILLED** *Seeds, oth. forage plants* Animal Feed *Bran, etc. wheat* **BRAN, ETC. OTHER CEREALS** **LUCERNE (ALFALFA)** *Brew, distl. dregs, waste* Vegetable residues etc. Fodder roots, forage, etc. Other **BOVINE SEMEN** Animal products, nes *Prodct. fish, etc. inedible*
Services	

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CLUSTERS OF INTERNATIONALLY COMPETITIVE CANADIAN INDUSTRIES, 1989

	HOUSING/HOUSEHOLD	TEXTILES/APPAREL	HEALTH CARE	PERSONAL	ENTERTAINMENT / LEISURE
Primary Goods	*Wallpaper etc.* Other articles of bedding Parts, metal, wood furniture Doors, frames, thresholds Polishes etc. glass, metal Insect waxes; spermaceti Sanitary ware, nes, aluminum	Other vulcn.rubber apparel Female swimwear not knitted Articles of furskin Other leather articles nes	**COBALT RADIATION THERAPY EQUIPMENT*****	Soap etc. for toilet use *Matches* Combustible products nes Nonmetal watch bands etc *Perfume, cosmetic, etc.nes*	Photo *Cinematograph. projectors* *Cine film, 35mm +, developed* Other **ICE AND ROLLER SKATES** *Sports goods, nes* *Foliage, other vegetation* *Pipe and reed organs etc.* Albums for collections Newspapers*
Machinery					
Specialty Inputs	Asphalt articles etc. Articles of plaster Prepared driers **GYPSUM AND ANHYDRITE** **HYDRAULIC LIME** *Prefab. building components* Portland cement	Fiber Yarns Textured yarn, not retail Other yarn, single Yarn, 85%+syn. stp. fbr, rtl Asbestos manf. articles. etc. **ABACA, MANILA HEMP, RAW** **FLAX TOW AND WASTE** Other synth. flt. yarn, bulk Artificial filament tow Artificial staple fibr,unpr Hi-tencty yarn, nylon, bulk Skins Bovine hides, skins, fresh Bovine hides, skins, other **FURSKINS, BEAVER** **FURSKINS, OTHER** **FUR PCS. ETC. FURRIER USE** **FURSKINS, MUSKRAT** *Furskins, seal* *Equine hides, skins*	*Stable isotopes etc.*	*Ambergris, civet, musk, etc.* Human hair, unworked etc. Tobacco refuse	
Services					

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TABLE B

TOP 50 SWEDISH INDUSTRIES IN TERMS OF WORLD EXPORT SHARE, 1989

INDUSTRY	Share of Total World Exports	Export Value ($000)	Import Value ($000)	Trade Balance	Share of Total Swedish Exports
Nicotine and its salts	84.5	3596	557	3039	0.01
Sack kraft paper, creped,etc	73.6	34699	50	34649	0.07
Tube,pipe fittings,iron.steel	71.1	72764	2	72762	0.14
Bar,rod,hi-speed steel	51.8	34456	2177	32279	0.07
Chemical wood pulp,sulphite unbleached	51.2	35659	639	35020	0.07
Sack kraft paper,uncoated	47.3	370337	269	370068	0.72
Other synthetic stones unworked	43.8	34476	66	34410	0.07
Carbonizing base paper	43.1	26962	569	26393	0.05
Oxygen-function amino-compounds	43.1	49451	1	49450	0.10
Mechanical wood pulp	42.8	169406	2012	16n94	0.33
Other kraft paper,board,coated	42.8	108033	324	107709	0.21
Polyethylene	42.5	364473	0	364473	0.71
Natural calcium phosphate ground	42.0	3643	1	3642	0.01
Bar,rod,iron,.60%+carbon	38.3	8119	95	8024	0.02
Straight saw blades,metalworking	37.1	27319	995	26324	0.05
Hollow drill bar,rod,steel	36.8	19421	2285	17136	0.04
Cellulose pulp making machinery	35.9	142330	11862	130468	0.28
Toasted bread, etc.	34.3	80613	9780	70833	0.16
Provitamins,vitamins,etc	33.9	2074	1	2073	0.00
Multi-ply paper,board,uncoated	32.6	160247	3986	156261	0.31
Coal cutters,tunneling machine	31.6	44522	4852	39670	0.09
Hand saws	31.0	21436	2319	19117	0.04
Kraft paper,unct<150g/m2	30.5	272400	7251	265149	0.53
Washing machines,laundry	30.2	57228	1192	56036	0.11
Spherical roller bearings	29.8	127212	13701	113511	0.25
Kraft paper, uncoated	28.3	612316	4889	607427	1.19
Footwear,wooden soles	25.7	6948	159	6789	0.01
Matches	25.6	19273	418	18855	0.04
Other bar,rod stainless.steel	24.7	25235	3583	21652	0.05
Telephone switching equipment	24.5	697257	12114	685143	1.35
Chemical wood pulp,coniferous	23.8	68321	44	68277	0.13
Wire,stainless steel	23.2	106077	8053	98024	0.21
Other plastic coated paper	22.6	288322	41560	246762	0.56
Iron ore agglomerates	22.2	212472	16	212456	0.41
Paper etc.graphic use nes	22.1	236936	5772	231164	0.46
Fat,oil,fraction marine mammal	21.5	396	1	395	0.00
Other bar,rod hi-speed steel	21.5	43844	1613	42231	0.09
Other bar,rod other alloy steel	21.3	44963	1920	43043	0.09
Natural polymers	21.2	33950	4059	29891	0.07
Glass working machine parts	21.1	86034	20644	65390	0.17
Kraft paper,over225g/m2	20.3	51582	1710	49872	0.10
Ozone,oxygen etc. therapy	20.0	80232	7998	72234	0.16
Motor vehicle chassis	19.7	296311	2856	293455	0.58
Other lifting machine not self-propelled	19.5	119707	19300	100407	0.23
Other generating sets	19.3	66149	4776	61373	0.13
Light vessels, etc.nes	18.5	71345	502	70843	0.14
Other circular tube,stainless steel	18.3	194398	21411	172987	0.38
Other paperboard,kao.coat,bulk	18.0	277257	13847	263410	0.54
Self-propelled rail,tram.coach	17.6	39075	13027	26048	0.08
Oth.angle,etc.iron,n-a.st	17.6	40563	8605	31958	0.08
TOTAL					11.69

SOURCE: UN SITC TRADE STATISTICS (REVISION 3 PRELIMINARY)

FIGURE C

PERCENTAGE OF CANADIAN EXPORTS OF COMPETITIVE INDUSTRIES BY SECTOR AND VERTICAL STAGE, 1989

Materials/ Metals

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	5.9	-1.3	4.1	1.5
Machinery	0.2	-0.0	1.7	0.6
Specialty Inputs	6.4	3.2	20.0	13.4
Total	12.4	1.9	8.6	3.6

Forest Products

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	15.4	-3.0	23.4	5.4
Machinery	0.0	-0.0	0.8	-0.7
Specialty Inputs	0.0	+0.0	8.7	5.9
Total	15.5	-3.0	21.9	4.8

Petroleum/ Chemicals

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	9.2	-0.1	4.8	2.6
Machinery	—	—	—	—
Specialty Inputs	—	—	—	—
Total	9.2	-0.1	4.8	2.6

Semiconductors /Computers

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	0.0	-1.0	0.0	-2.2
Machinery	—	—	—	—
Specialty Inputs	—	—	—	—
Total	0.0	-1.0	0.0	-2.2

Multiple Business

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	0.0	-0.2	0.0	-0.1
Machinery	0.0	-0.1	0.0	-0.1
Specialty Inputs	0.1	-0.0	1.0	+0.0
Total	0.1	-0.3	0.0	-0.1

Transportation

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	20.3	-0.9	7.8	2.4
Machinery	—	—	—	—
Specialty Inputs	6.9	-5.9	6.0	-1.5
Total	27.2	-6.8	7.0	1.2

Power Generation & Distribution

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	0.8	-0.8	1.0	-0.5
Machinery	—	—	—	—
Specialty Inputs	0.4	-0.7	12.4	2.0
Total	1.0	-1.5	1.6	-0.9

Office

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	0.1	0.1	0.2	0.2
Machinery	—	—	—	—
Specialty Inputs	—	—	—	—
Total	0.1	0.1	0.1	0.1

Telecommunications

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	0.4	0.4	1.3	1.3
Machinery	—	—	—	—
Specialty Inputs	—	—	—	—
Total	0.4	0.4	1.3	1.3

Defense

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	0.0	+0.0	0.1	0.1
Machinery	—	—	—	—
Specialty Inputs	—	—	—	—
Total	0.0	+0.0	0.1	+0.1

Food/ Beverages

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	3.5	0.6	2.8	1.6
Machinery	0.3	-1.2	1.3	-2.2
Specialty Inputs	4.3	2.8	7.4	6.2
Total	8.1	2.2	4.0	2.5

Housing/ Household

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	0.5	0.1	0.8	0.4
Machinery	—	—	—	—
Specialty Inputs	0.6	-0.3	4.0	0.9
Total	1.1	-0.2	1.4	0.4

Textiles/ Apparel

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	0.1	0.1	0.1	0.1
Machinery	0.0	-0.1	0.0	-0.4
Specialty Inputs	0.3	0.2	0.7	0.6
Total	0.5	0.2	0.3	0.2

Health Care

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	—	—	—	—
Machinery	—	—	—	—
Specialty Inputs	0.0	+0.0	0.8	0.6
Total	0.0	+0.0	0.0	+0.0

Personal

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	0.0	-0.1	0.0	-0.1
Machinery	—	—	—	—
Specialty Inputs	0.0	-0.0	0.3	-0.0
Total	0.0	-0.1	0.0	-0.1

Entertainment/ Leisure

	SCE	Δ SCE	SWCE	Δ SWCE
Primary	0.1	-0.2	0.1	-0.2
Machinery	—	—	—	—
Specialty Inputs	0.0	-0.5	0.0	-3.8
Total	0.1	-0.7	0.1	-0.6

Upstream Industries

SCE	Δ SCE	SWCE	Δ SWCE
30.6	-5.3	6.2	2.0
0.2	-0.1	1.4	0.3
6.4	3.2	19.9	13.3
37.2	-2.2	6.9	2.6

Industrial and Supporting Functions

SCE	Δ SCE	SWCE	Δ SWCE
21.4	-1.3	3.9	0.9
0.0	-0.1	0.0	-0.1
7.4	-6.7	6.0	-1.4
28.8	-8.0	3.7	0.2

Final Consumption Goods and Services

SCE	n SCE	SWCE	n SWCE
4.2	0.5	1.0	0.4
0.3	-1.3	0.8	-1.7
5.3	2.2	4.0	2.8
9.8	1.4	1.5	0.7

75.8	-8.8	3.9	1.1

Note: Totals may not add due to rounding

SCE share of country's total exports 1989
SWCE share of world cluster exports 1989

Δ SCE change in share of country's total exports 1978–89
Δ SWCE change in share of world cluster exports 1978–89

FIGURE D
NON–U.S. EXPORT DESTINATION
BY CLUSTERS OF INTERNATIONALLY COMPETITIVE CANADIAN INDUSTRIES, 1989

	MATERIALS/METALS		FOREST PRODUCTS	
Primary Goods	Iron and Steel Flat iron 640+mm, oth pltd Semi.fin. iron. etc. .25% +c **ALLOY PIG IRON, ETC.** **HOLLOW DRILL BAR, ROD,STL** Non-Ferrous Metals Zinc alloys **REFINED COPPER** ● **ALUMINUM, NOT ALLOYED** ● Nickel alloys ● **REFINED LEAD, UNWROUGHT** *Platinum, alloys, unwrought*	Metal Manufactures *Articles of lead, nes* ● *Articles of nickel, nes* Aluminum wire ● Other **ASBESTOS** Waste and Scrap Waste, stainless steel **GRANULATED SLAG** **COBALT, UNWROUGHT, WST, SCRAP** *Cadmium, unwrought, wst, scrap* ● *Waste, scrap, prec. meatl nes* *Cermets, articles, waste, scrap* Oth. base metal, unwrt, waste	Wood Products **WOOD, CONIFER, SAWN** ● Wood, conif, rough, untreated **WOOD CHIPS, CONIF.** Wood chips, non–conifer. *Plywood, soley wood, other* *Fibreboard, dens. 0.5–.8g/cm3* Casks, barrels, etc. staves Paper *Sack kraft paper, uncoated* ● *Semi–chem. fluting paper* ●	Pulp **CHEM.WOOD, PULP, CONF. BLEACHED** **CHEM. WOOD, PULP, SULP. BLEACHED** ● *Chem. wood, pulp, dissolving* *Chem. wood pulp, non–coniferous bleached* ● **CHEM. WOOD PULP, SULP. UNBLEACHED** ● *Chem. wood pulp, conifer* **SEMI–CHEM. WOOD PULP** **MECHANICAL WOOD PULP** Wood-based Chemical Products *Residual lyes from wood pulp*
Machinery	*Rock cutters,tunneling machinery*		**CHAIN SAW BLADES** *Cellulose pulp mfg. machinery* ●	
Specialty Inputs	*Molybdenum ore etc. roast* *Molybdenum ore etc.other* **NIOBIUM, TANTALUM, VANADIUM** Iron pyrites, unroasted **IRON ORE AGGLOMERATES** ● *Iron ore, conctr. not agg* **CRUDE, UNREFINED SULPHUR** **NICKEL MATTES** **COPPER ORES, CONCENTRATES**	**COPPER MATTES** **ZINC ORES, CONCENTRATES** **NONMONETARY GOLD, UNWRT, SEMIMFD** Tin ores, concentrates Base metal ore, cnctr. nes **LEAD ORES, CONCENTRATES** **SILVER ORES, CONCENTRATES** **OTHER PREC. METAL ORE, CONCENTRATES** *Bituminous coal, not agglomerated*		
Services	**GEOPHYSICAL CONTRACTING** ***			

Key

Modern Font	5.1% export share or higher, but less than 10.3% share
Modern Italics	*10.3% export share or higher, but less than 20.5% share*
MODERN BOLD	**20.5% EXPORT SHARE OR ABOVE**

● **Greater than 50% share of Canadian exports to the U.S.**

nes	Not elsewhere specified
*	Added due to FDI
**	Upgraded due to FDI
***	Added based on in-country research

FIGURE D
NON–U.S. EXPORT DESTINATION
BY CLUSTERS OF INTERNATIONALLY COMPETITIVE CANADIAN INDUSTRIES, 1989

	PETROLEUM/CHEMICALS			SEMICONDUCTORS/ COMPUTERS	
	Organic Chemicals	Inorganic Chemicals	Plastics		
Primary Goods	Propyl, isopropyl alcohol ● Acyclic hydrocarbons, nes ● *Ethylene glycol* *Styrene* Xylenes, pure ● *1,2-Dichloroethane* **METHANOL (METHYL ALCOHOL)** **PENTAERYTHRITOL**	**SELENIUM, PHOSPHORUS** ● Calcium, strontium, barium *Cobalt oxides, hydroxides*	*Polyethylene s.g.<0.94* ● Ethyl-vinyl acet. copolymer Alginic acid, salts, ester ●	Analog or hybrid computer ●	
Machinery					
Specialty Inputs					
Services					

Key

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FIGURE D
NON-U.S. EXPORT DESTINATION
BY CLUSTERS OF INTERNATIONALLY COMPETITIVE CANADIAN INDUSTRIES, 1989

	MULTIPLE BUSINESS	TRANSPORTATION	POWER GENERATION AND DISTRIBUTION	OFFICE	TELECOMMUNICATIONS	DEFENSE
Primary Goods	Instruments Demonstration instrument Gas meters Other Files, rasp, similar tools	Vehicles *Rail, tram, freight cars* **FLIGHT SIMULATORS, ETC. PARTS** *Aircraft, ULW 2001-15000 KG* • *Helicopters, ULW <=2000kg* • Helicopters, ULW >2000 kg **CONSTRUCTION EQUIPMENT** *Snow-ploughs, -blowers* • Construction Equipment Self-propelled, construction, mining machinery Graders and levellers • Engines **TURBO-PROPELLER ENGINES** Other than turbo-jet engines	Parts, nuclear reactors *Parts, steam, gener. boiler*	**ACCOUNTING MACHINES** • Printed matter, nes • *Business forms**	Parts, line telephony equipment •	
Machinery	Other brazing, soldering machines •					
Specialty Inputs	**MILLSTONES ETC. FOR MILLING** •	Rubber Goods **ISOBUTENE-ISOPRNE RUBBER** • Parts Parts, navigational instruments • Other Tyre cord fabricated nylon etc.	**URANIUM DEPLETED, ETC.** *Radio-active material nes* •			
Services	*Consulting engineering**** Life insurance***	Transit management and design consulting***				

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FIGURE D
NON–U.S. EXPORT DESTINATION
BY CLUSTERS OF INTERNATIONALLY COMPETITIVE CANADIAN INDUSTRIES, 1989

	FOOD/BEVERAGES		
Primary Goods	Basic Foods **CRUSTACEANS, NOT FROZEN** • *Other crustacea, frozen* *Salmon, frozen ex.roe* *Other fish, frozen ex. roe* Herr. sardines, fh, chilled ex.roe *Cod, frozen ex. roe* Fish, livers, roes, frozen **OTHER FISH, SALTED** *Other molluscs, frozen, dry, salted* • **LENTILS, DRIED, SHELLED** **MEAT OF HORSES, MULES, ETC.** **NATURAL HONEY** • *Other fruit, nuts, frozen* *Beans, ex.brd, hrs. dry, shelled* *Bovine animals, pure, breeding* Poultry, live, to 185g • Egg albumin	Egg, unshelled; yolks, dried Ed. offal sheep, horse, frozen Edible offal, swine, frozen Potatoes, unpickled, frozen • Malt, including malt flour Meat of swine, frozen Processed Foods **FISH LIVER, ROE, DRD, SMKD.** Fish, smoked **SALMON, WHOLE PCS, PRPD, PRESERVED** **COD, SALTED** Peas, dried, shelled Sweet corn, prepd, preserved *Mustard* • *Other meat, offal flour* *Homogenized cooked fruit*	Edible Oils *Rape, colza etc. oil, refined* • Rape, colza etc. oil, crude • Linseed oil, crude Fats other animals, etc.
Machinery	Agricultural Equipment Dryers, agricult. products Poultry–keeping machinery •		
Specialty Inputs	Agricultural Chemicals *Ammonium sulphate* • **POTASSIUM CHLORIDE** • **POTASSIC FERTILIZERS, NES** Cereals / Seeds, Etc. **DURUM WHEAT, UNMILLED** *Barley unmilled* **BUCKWHEAT, UNMILLED** *Other wheat, meslin, unmilled* **UNMILLED RYE** Cereals, unmilled, nes **RAPE OR COLZA SEEDS** **OIL–CAKE, RAPE, COLZA SEEDS** • **LINSEEDS** **MUSTARD SEEDS** **CANARY SEEDS, UNMILLED** *Seeds, other forage plants* •	Animal Feed *Bran, etc. wheat* **BRAN, ETC. OTHER CEREALS** • **LUCERNE (ALFALFA)** Vegetable residues etc • Fodder roots, forage, etc. • Other **BOVINE SEMEN** Animal products, nes	
Services			

Key

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TABLE E

PERCENTAGE OF TOTAL CANADIAN TRADE BY U.S.-OWNED AFFILIATES IN CANADA

	EXPORTS	EXPORTS TO U.S.	IMPORTS	IMPORTS FROM THE U.S.
PETROLEUM	43.0	47.5	2.0	9.7
MANUFACTURING	34.6	43.8	35.6	51.1
Food and Kindred Products	3.1	5.5	10.9	21.7
Chemical and Allied Products	21.6	33.4	29.6	43.4
Primary and Fabricated Metals	12.3	17.2	9.6	15.1
Machinery (except electrical)	0.0	0.0	18.2	25.4
Electric and Electronic Equipment	17.0	22.8	8.4	11.8
Transportation Equipment	70.2	73.5	80.2	96.8
Other Manufacturing	0.0	0.0	10.4	18.5

SOURCE: U.S. DEPARTMENT OF COMMERCE; ISTC; MONITOR COMPANY ANALYSIS

NOTES

NOTES

Chapter 1

1 The Royal Commission on Canada's Economic Prospects (1957) 334.

2 OECD, *Economic Outlook* (1991) 120.

3 OECD, *Economic Outlook* (1991) 120.

4 Love and Poulin (1991); and *The Globe and Mail* (19 September 1991) B1.

5 Toronto Dominion Bank (1990).

6 The industries were chosen in conjunction with representatives of the federal government, the Business Council on National Issues (BCNI) and the project's Economic Advisory Group.

NOTES

Chapter 2

1 "World market economy" comprises total world exports less exports from centrally planned economies. All trade statistics refer to the value of trade, not quantity.

2 The new UN SITC Revision 3 is used to provide a comprehensive representation of trade in 1989, the only year for which it is currently available. Data for previous years, beginning with 1978, employs SITC Revision 2 which comprises approximately 2,600 industries. Revision 2 is used to track changes, with 1978 as the base year. Industry data for a given year reflects trade statistics of only those countries that have reported to the UN. Data on trade may be incorrectly recorded and hence comparisons between years are subject to some limitations.

While trade classifications are by no means perfect identifiers of "industries," we believe the higher level of disaggregation they afford comes closer to defining strategically distinct business units than other broader measures.

3 Export share, while the best available measure, is not without its problems. While stable or rising export share is almost always a reliable sign of competitiveness, falling share may not always be a sign of loss of competitiveness. An industry's exports might be growing but growing less rapidly (possibly because of outbound foreign investment) than other nations, or the nation's firms could be competitive in slower growing segments or shifting their focus to more sophisticated niches. Our data, because it is highly disaggregated, is less prone to the latter problem. To counter the former problem, we examined the absolute changes in exports to verify that those industries losing export share are truly becoming less competitive.

4 For a more detailed description of the methodology employed in the statistical analysis, please refer to Porter (1990) Appendix A.

5 Data on services trade is too aggregated to be included in the statistical analysis.

6 See Porter (1990) Appendix A for a more complete methodological description. Designating an industry as internationally competitive based on its export share has a tendency to overstate Canadian industries that are truly internationally competitive, due largely to the incidence of managed trade and the high percentage of Canadian trade with the United States.

Canada's share of world market economy exports, based on the total trade of countries that had reported their 1989 statistics to the UN by the time of this study, was 5.1 percent. The number of countries reporting to the UN varies from year to year as does the timing of their reports. Each year the UN publishes its estimate of total world trade. Based on this estimated world total for 1989, Canada's share of world market economy exports was 4.1 percent. This estimated share was used to gauge Canada's overall share of world resource exports.

In order to access and assess the latest available data on Canada compared to other major trading nations, we utilized the 1989 data and 5.1 percent as Canada's cutoff. We also examined all industries in which Canada has a world export share between 4.1 and 5.1 percent. There were few of these industries. Most of them were resource-based industries.

"Competitive" industries were those with a share of world exports above Canada's cutoff and a positive trade balance (unless their world export share was at least two or more times above Canada's cutoff). The rationale for this procedure is that a negative trade balance raises serious questions about the strength of a nation's indigenous competitive advantage in the industry, unless its share of world exports was high. In the latter case, the explanation was most likely that the nation had a strong position in one or more segments of the industry (as defined in the SITC classification), though a weak position in others. Including the industry was therefore justified. The choice of two times the cutoff share was arbitrary.

In the original ten-nation study, industries that meet the cutoff criterion were excluded from the list of "competitive" industries if their trade was almost exclusively with neighbouring nations. A preponderance of trade with neighbours indicated that the nation's competitive advantage was not significant in international terms and trade solely reflected geographic proximity. However, if there were indications of significant foreign direct investment by the nation's firms in such an industry, the industry was left on the list.

In this study, we included Canada's trade with the U.S. primarily because of the significance of the U.S. market to Canadian exporters (75 percent of Canada's exports are to the U.S.) and the significance of the U.S. market in and of itself (since the U.S. is a large and sometimes sophisticated market).

Of the industries above the cutoff in 1978, 61 were below the cutoff in 1989. Of these, 85 percent had a real decline in terms of their export value and 8 percent had an increase in export value though their export share declined.

7 As seen in the following table, a similar pattern occurs in other advanced economies. All the economies had a relatively small fraction of their total industries accounting for more than 50 percent of exports above their respective cutoffs.

	Cutoff (Average Share of World Market Economy Exports)	Number of Competitive Industries	Percent of Total Exports
Canada	5.1	246	75.8
U.S.	16.0	457	59.5
Japan	12.1	353	82.7
Korea	2.7	316	81.4
Germany	14.9	707	71.4
Italy	6.2	554	65.9
U.K.	6.6	469	56.5
Sweden	2.3	300	71.4
Switzerland	2.3	367	77.2

8 For a fuller description of how industries are identified and positioned on the cluster chart, see Appendix A in Porter (1990).

9 The following chart portrays the absolute and relative export changes in the industries cited.

	Export Value		World Export Share	
	1978	1989	1978	1989
Bituminous mixtures	$8.6M	$2.3M	9.3%	2.3%
Mineral tar oils	$94.7M	$22.2M	25.7%	2.3%
Pitch coke	$9.0M	$0.3M	10.2%	0.7%

10 Alam, Li and Oldenburg (1989).

11 See Table E in the Appendix.

12 Statistics Canada, *Calura* (1990).

13 The following chart portrays the absolute and relative export changes in the industries cited.

	Export Value		World Export Share	
	1985	1989	1985	1989
Central heating equipment	$39.7M	$23.7M	5.3%	1.4%
Glass articles*	$31.7M	$6.5M	14.0%	2.4%
Manufactured non-ceramic mineral articles	$102.8M	$11.3M	18.8%	1.7%

***Comparison years are 1978 and 1989.**

14 Exports of synthetic fibres accounted for a further 22.7 percent of competitive exports in this cluster.

15 The share of competitive machinery industries, which can be highly segmented, may be somewhat understated.

16 Examining Canadian trends in net exports using conventional industry groupings can reveal a much more benign picture. For example, Lipsey and Smith (1986), looked at changes in net exports by 2-digit SIC industries. They found that roughly half of Canada's 2-digit industries increased net exports and half decreased net exports, which they suggested may have reflected increased intra-industry trade in niches.

Some economists have attempted to track intra-industry trade in the Canadian economy by identifying industries that have had simultaneous real growth in exports and imports. Others have examined intra-industry trade by examining manufacturing industries that had simultaneous increases in the share of production exported and the share of consumption filled by imports.

Trade statistics are subject to reporting errors. One problem is the classification of exports and imports to the same industry when they should be classified differently. The use of broadly aggregated data increases this type of error. Examining trade flows at the 2- or 3-digit level risks overstating intra-industry trade. The level of aggregation at these levels indicates broad trade flows which may be intra-sectoral (trade between various industries within the sector) or intra-industry. In addition, exports and imports may also be classified differently during different time periods. Historical data is more subject to this type of error than current data. Another problem is overlapping trade which occurs when an industry is defined incorrectly, such that goods produced with different factor-endowment ratios are classified in the same industry. These factors, on balance, lead to an overstatement of the degree of intra-industry trade. For a discussion on some of these problems see MacCharles (1987).

One methodology of examining intra-industry trade employed in MacCharles (1987) used simultaneous real increases in exports and imports as indicators of increasing intra-industry trade. Using a similar methodology of examining industries where both real exports and imports increased between 1978 and 1989, we found 793 such industries. (If, however, we limited industries to those where exports rose as fast as the world industry's growth, the number decreased to 354.)

There were few signs of industries shifting into more sophisticated segments. Resource-based industries represented 28 percent of these industries in terms of numbers and 38 percent of export value. Nearly 90 percent of the number (accounting for 62 percent of the value) of resource-based industries were unprocessed industries. Nearly half of the resource-based industries were in the food/beverages sector.

In terms of export value, almost half of all the industries were from the industrial and supporting level. Transportation equipment industries accounted for 38 percent of the value, the highest of all the sectors. The multiple business sector industries represented only six percent of export value.

Nearly half of the number of industries were from the final consumption goods level and comprised mainly the food/beverages and textiles/apparel clusters. The food/beverages cluster had the highest number of industries, 144 (18 percent), representing 6.8 percent of export value. The textiles/apparel cluster had 104 industries (13 percent) and 0.7 percent of export value. Other sectors represent 3.8 percent of value (17 percent of numbers)

Overall, most of the industries were very small and had very low world export share Nearly three-quarters (73 percent) had exports of less than $30 million (0.02 percent of total Canadian exports). In fact, 46 percent had exports valued at less than $5 million, and about a quarter (22 percent) at less than $1 million. Imports have generally increased and 78 percent of these industries have negative trade balances. In fact, nearly 66 percent of these industries have imports greater than or equal to twice the value of exports.

Few of these industries show signs of becoming more sophisticated. For example, in the food/beverages sector, which has the highest number of industries where exports and imports increased, 103 of the 144 industries (71.5 percent) were resource-based, of which only 4 (2.7 percent) were processed.

Some shifts suggest increasing specialization may be occurring. However, there was little indication of upgrading into more sophisticated segments. Our much more disaggregated data offers less support for the niche hypothesis and does not indicate a pattern of upgrading that some others have suggested. And the patterns of change in net exports we find raises real questions about the trajectory of adjustment.

17 Alam, Li and Oldenburg (1989).

18 U.S. Department of Commerce, *U.S. Direct Investment Abroad* (various years).

19 Alam, Li and Oldenburg (1989).

20 See Table E in the Appendix.

21 Production/shipment data was only available at 3- and 4-digit level in the Canadian Standard Industrial Classification (SIC) system and the data could not be disaggregated to correspond to the SITC 5-digit commodity-based system. The SIC industries are measured at the establishment level and hence, within any one SIC industry, shipments could correspond to several different SITC industries. Furthermore, 1989 shipment data was based on the 1980 SIC while 1978 data was 1970 SIC, which was even less disaggregated.

NOTES

Chapter 3

1 Portions of this Chapter are excerpted from Porter (1990).

2 These issues are discussed more fully elsewhere. See Porter (1990).

3 Richard Lipsey provided useful comments for this section.

4 For a more detailed examination of the New Zealand economy, see Crocombe, Enright and Porter (1991).

5 Such arguments are common in smaller economies. See, for example, the discussion in Crocombe, Enright and Porter (1991).

6 A vigorous debate took place in Canada in the late 1970s and early 1980s over the question of whether or not the existing foreign-owned firms in Canada were acting in ways detrimental to Canadian welfare. The debate was fueled by various work done by or on behalf of the Science Council of Canada. See, for example, Britton and Gilmour (1978). The basic contention of this work is that foreign-owned firms in Canada were "truncated" -- they did not perform all of the functions necessary for a firm to be internationally competitive. The truncated firms, and FDI, were blamed for Canada's inefficient and fragmented industrial structure and Canada's reliance on natural resource-based exports.

The Science Council's work was empirically deficient and ignored a robust alternative explanation for the fragmentation and inefficiency it was trying to explain. Eastman and Stykolt contended that tariffs and weak competition policy towards oligopolies in Canada encouraged entry to industry at less than efficient scale, and the multiplication of product lines. The resulting inefficient scale and consequent high unit costs of production resulted in poor trade performance. Furthermore, the small size of the Canadian firms encouraged them to seek foreign partners to perform scale-sensitive functions. Thus FDI might be a symptom or outcome, but not a cause, of Canada's underlying economic problems. See H.C. Eastman and S. Stykolt (1967).

The Science Council's position was further undermined by numerous studies performed before, during and after the debate which showed a positive correlation between foreign ownership and technical efficiency [see, for example, Caves, Porter, Spence and Scott (1980)] and between foreign ownership and productivity in an industry [see Globerman (1979)]. Findings with respect to correlations between R&D expenditures and foreign ownership are more equivocal and apparently industry specific. See, for example, Safarian (1969); McFetridge (1977) and McFetridge and Weatherley (1977). The above issues are eloquently discussed in Safarian (1985).

[7] See Chapter 11 for the exceptions.

[8] Porter (1990) 19.

[9] One of the principal rationales given in the economics literature for the development of multinational enterprises is their ability to exploit intangible assets, such as expertise and technology, across national borders. See Caves (1982). Part of the benefit that foreign investment brings to the host nation is such expertise and technology. The benefits, again in terms of productivity, productivity growth, spillovers and externalities, and in the strength of the local diamond derived from the presence of a foreign multinational in an industry may exceed those derived from a domestic company in the same industry if the foreign multinational is in some way more advanced than the domestic firm. If, in contrast, the domestic firm is equally sophisticated in its technology, expertise and operations, then it will tend to provide greater benefits to the local economy.

[10] See for example, Rugman and D'Cruz (1991).

[11] *The Toronto Star* (2 September 1991) D1.

[12] See also, Bartlett and Ghoshal (1989).

NOTES

Chapter 4

1 Forest Sector Advisory Council, *Newsprint Cost Study (*1990) 40.

2 Forest Sector Advisory Council, *Newprint Cost Study* (1990).

3 Doern (1990) 169.

4 Doern (1990) 174. Note that comparisons of international environmental legislations are constrained by the inconsistency of the available data.

5 New regulations under the Ontario Municipal and Industrial Strategy for Abatement (MISA) are still being negotiated, but most significantly, will apply across the board. It is anticipated that MISA will likely result in a significant overall toughening of Ontario standards in the future.

6 Jasper Mardon, 1990 Tappi Gold Medallist.

7 *Canadian Paper Analyst* (1990) 7-8, in conjunction with Canadian Pulp and Paper Association data.

8 Kuhnke (1989).

9 Government of Ontario, Ministry of the Environment staff members, interviews conducted by Monitor Company.

10 Department of Industry and Economic Development (1984). The 14 largest carriers in Canada currently account for 99 percent of all plant and revenue and there are approximately 70 telephone companies in Canada.

11 Michael E. Porter, unpublished analysis.

12 Ryans (1983).

13 Information for this section drawn from Ryans (1983).

14 Hansman and Kohlberg (1989) 193-222.

15 Northern Telecom, *Annual reports* (various years); Northern Telecom officials, interviews conducted by Monitor Company.

16 Northern Telecom, *Annual reports* (various years); Northern Telecom officials, interviews conducted by Monitor Company.

17 Association of Canadian Distillers (A.C.D.), *Annual Statistical Reports* (various years).

18 A.C.D. officials, interviews conducted by Monitor Company.

19 Joseph E. Seagram and Sons officials, interviews conducted by Monitor Company.

20 Joseph E. Seagram and Sons officials, interviews conducted by Monitor Company.

21 Impact Databank.

22 A.C.D., and Joseph E. Seagram and Sons, interviews conducted by Monitor Company.

23 Grocery Products, Department of Industry, Science and Technology Canada official, interview conducted by Monitor Company.

24 A.C.D. officials, interviews conducted by Monitor Company.

25 A.C.D., *Annual Statistical Reports* (various years); A.C.D. officials, interviews conducted by Monitor Company.

26 Joseph E. Seagram and Sons officials, interviews conducted by Monitor Company.

27 The Scotch Whisky Association (1990) 12.

28 Joseph E. Seagram and Sons, *Annual Reports* (various years).

29 Various industry experts, interviews conducted by Monitor Company.

30 Various industry experts, interviews conducted by Monitor Company.

31 The Society of Exploration Geophysicists (various issues).

32 Paterson, Grant, and Watson official, interview conducted by Monitor Company.

33 Seigel (1982).

34 Various industry experts, interviews conducted by Monitor Company.

35 Geosoft uses shadow mapping technology developed at the Geological Survey of Canada adapted for use on PCs.

36 Geological Survey of Canada and Geosoft officials, interviews conducted by Monitor Company.

37 Data from the Geological Survey of Canada.

38 OMESE official, interview conducted by Monitor Company.

NOTES

Chapter 5

1 Forest Sector Advisory Council, *The Market Pulp Industry* (1990) 16-18.

2 Forest Sector Advisory Council, *The Market Pulp Industry* (1990) 33.

3 Forest Industry Machinery Task Force (1988) 69.

4 Aerospace, Defence and Industrial Benefits Branch, Department of Industry, Science and Technology Canada official, interview conducted by Monitor Company.

NOTES

Chapter 6

1 The Economist, *World Atlas and Almanac* (1989) 96-97.

2 IMD International and The World Economic Forum (1990) 283-84.

3 IMD International and The World Economic Forum (1991) 38-288.

4 Government of Ontario, *Forest Resource Development Agreement* (1988).

5 Department of Fisheries and Oceans officials, interviews conducted by Monitor Company.

6 Unlike the U.S., Canada restricts licences and establishes quotas by species and by region.

7 Mineral Policy Sector, Energy, Mines and Resources Canada, interviews conducted by Monitor Company.

8 *Materials and Society* (1986).

9 Balazik and Klein (1987); Fraser, Barsotti and Rogich (March 1988).

10 IMD International and The World Economic Forum (1991) 293.

11 ISTC officials, interviews conducted by Monitor Company.

12 Hirst (February 1991) 52.

13 ISTC officials, interviews conducted by Monitor Company.

14 Gratuick (1989).

15 Gratuick (1989) 54.

16 Hirst (February 1991) 52.

17 Toulin (12 April 1991) 3.

18 Many now consider this network to be over-extended, and recent reports have suggested that the extension to Quebec will likely be shut down. See, for example, *The Globe and Mail* (5 December 1990) B1.

19 Cruikshank (November 1988) 86–93.

20 Canadian National Railways (1990) 18.

21 Government officials and industry management, interviews conducted by Monitor Company.

22 *The Globe and Mail* (24 May 1991) A1.

23 OECD, *Social Indicators* (1991) 85.

24 OECD, *Social Indicators* (1991) 85. Only 2 percent of the Canadian population spends more than one hour daily travelling to and from work.

25 Lalonde (17 November 1990) *A6.*

26 IMD International and The World Economic Forum (1991) 338.

27 UNESCO (1989).

28 Statistics Canada, *Advance Statistics of Education 1990–91* (1990) 23.

29 IMD International and The World Economic Forum *(*1991*)* 266, 268.

30 The Globe and Mail Report on Business Magazine and The Economist Publications (1989) 77.

31 UNESCO (1989).

32 See, for example, Canadian Labour Market and Productivity Centre, *Report of the CLMPC Task Forces on the Labour Force Development Strategy* (1990) 161–62; Ministry of Skills Development, Government of Ontario, Annual listings of occupation shortages; *The Globe and Mail Report on Business Magazine* (March 1991) 50.

33 Statistics Canada, *The Daily* (23 July1991) 7.

34 See, for example, Economic Council of Canada, *Transitions for the 90s* (1990); and Economic Council of Canada, *Employment in the Service Economy* (1991).

35 See, for example, Economic Council of Canada, *Transitions for the 90s* (1990) 34–37; and Atlantic Canada Opportunities Agency (1987) 157–74.

36 Government of Canada, *Prosperity Through Competitiveness* (1991).

37 Southam Newspaper Group (1987) 18.

38 Southam Newspaper Group (1987) 9.

39 Human Resource Development Center (1990) 5.

40 Estimates include only the direct costs of industrial accidents caused by illiteracy. Source: Department of Employment and Immigration Canada, *Measuring the Costs of Illiteracy in Canada* (1988) Appendix 1, 15 .

41 Government of Canada, *Prosperity Through Competitiveness* (1991) 6.

42 See, for example, National Advisory Board on Science and Technology, *Science, Technology, Innovation and National Prosperity: The Need for Canada to Change Course* (1991) 24. Forty percent of the immigrant Ph.D.s currently resident in Canada arrived in the decade between 1967 and 1976. More than 20 percent arrived during the following ten-year period. Shortages of highly qualified people now exist internationally, even in countries like Germany and Japan.

43 IMD International and The World Economic Forum (1990) 152.

44 Canadian Labour Market and Productivity Center, *Canadian Business Bulletin* (October 1990) 6-7.

45 *The Globe and Mail Report on Business Magazine* (March 1991) 50.

46 Canada Consulting Cresap (1990) Exhibit II.1.

47 Canadian Auto Workers, *Technological Change in the Auto Industry* (1987) 12.

48 Association of Canadian Community Colleges (1990).

49 Canadian Manufacturers' Association, *Training and Education: A Critical Investment for An Aggressive Economy* (1990).

50 For the academic year 1988-89, 47 percent of full-time community college students were enrolled in "university transfer programs": Statistics Canada, *Education in Canada* (1990) Table 9.

51 Department of Employment and Immigration Canada, *COPS News* (1991) 12.

52 Canadian Labour Market and Productivity Centre, *Report of the CLMPC Task Forces on the Labour Force Development Strategy* (1990) 169.

53 Canadian Labour Market and Productivity Centre, *Report of the CLMPC Task Forces on the Labour Force Development Strategy* (1990) 176.

54 Statistics Canada, *Education in Canada* (1990). Canadian Labour Market and Productivity Centre, *Report of the CLMPC Task Forces on the Labour Force Development Strategy* (1990) 163.

55 Government of Ontario, *People and Skills in the New Global Economy* (1990) 120.

56 *The Toronto Star* (20 September 1991) C1.

57 Statistics Canada, *Perspectives on Labour and Income* (1991).

58 Government of Ontario, *People and Skills in the New Global Economy* (1990) 123.

59 Canadian Manufacturers' Association, *Training and Education: A Critical Investment for An Aggressive Economy* (1990) 8.

60 Statistics Canada, *Perspectives on Labour and Income* (1991).

61 See, for example, remarks by Claudette MacKay-Lassonde, Director of University Manufacturing Initiatives, Northern Telecom, to Concordia University, 1 February 1990.

62 Government of Ontario, *People and Skills in the New Global Economy* (1990) 75.

63 Statistics Canada, *Education in Canada* (1990) 162.

64 Government of Ontario, *People and Skills in the New Global Economy* (1990) 74.

65 Department of Industry Science and Technology Canada, *Statistics on Engineers in Canada* (1990); professional association staff, interviews conducted by Monitor Company.

66 Interviews conducted by Monitor Company.

67 Science Council of Canada, *Science Education in Canadian Schools* (1984).

68 Officials from the Registrar's Offices at Queen's University and the University of British Columbia, interviews conducted by Monitor Company.

69 Canadian Council of Professional Engineers (1990).

70 Canadian Labour Market and Productivity Centre, *Report of the CLMPC Task Forces on the Labour Force Development Strategy* (1990) 201.

71 Canadian Labour Market and Productivity Centre, *Report of the CLMPC Task Forces on the Labour Force Development Strategy* (1990) 201.

72 Canadian Association for Co-operative Education (1989) vii-xi.

73 *The Globe and Mail* (17 January 1991) B5; and background information supplied by the Centre d'Adaptation de la Main-d'Oeuvre Aerospatiale au Québec.

74 Association of Universities and Colleges of Canada (1990).

75 University administrators and the Association of Universities and Colleges of Canada, interviews conducted by Monitor Company. See also National Advisory Board on Science and Technology, *University Committee Report* (1988).

76 Ministry of Skills Development, Government of Ontario, *Adjusting to Change: An Overview of Labour Market Issues in Ontario* (1988).

77 Department of Employment and Immigration Canada, *Success in the Works: A Profile of Canada's Emerging Workforce* (1989) 14.

78 IMD International and The World Economic Forum (1991) 339.

79 Government of Ontario, *People and Skills in the New Global Economy* (1990) 91-92.

80 Statistics Canada, *Human Resource Development Survey* (1987).

81 Canadian Life and Health Insurance Association officials, interviews conducted by Monitor Company.

82 Director of Development, Northern Telecom, interview conducted by Monitor Company.

83 Information obtained from Canadian Bankers' Association.

84 In Canada, 61 percent of public sector employees are unionized versus 36 percent in the U.S. In the private sector, the comparable levels are 22 percent and 12 percent in Canada and the U.S., respectively. (Source: Kumar, Arrowsmith and Coates (forthcoming 1991) 51-53; Monitor Company analysis.

85 Labour Canada, *Technology Impact Program* (1989) 49.

86 Interviews conducted by Monitor Company.

87 Labour Canada, *Provision in Collective Agreements* (1991).

88 Katz and Meltz (1991).

89 Canadian Auto Workers, *Statement on the Reorganization of Work* (1991) 5.

90 Labour Canada, *Technology Impact Program* (1989) 15.

91 Labour Canada, *Technology Impact Program* (1989) 49.

92 Labour Canada, *Technology Impact Program* (1989) 54.

93 Canadian Auto Workers, *Technological Change in the Auto Industry* (1987) 23.

94 Labour Canada, *Technology Impact Program* (1989) 13-14.

95 Wright (1991) 69-91.

96 Interviews conducted by Monitor Company with unions and firms.

97 Rankin (1990).

98 Government of Ontario, *People and Skills in the New Global Economy* (1990) 138.

99 Union and Department of Employment and Immigration Canada officials, interviews conducted by Monitor Company.

100 Solow (June 1988) 307-17; Denison (1985).

101 Interviews conducted by Monitor Company.

102 Forest Industry Machinery Task Force (1988) 69.

103 Statistics Canada, *Indusrial Research & Development Statistics* (1989) Table 15.

104 Interviews conducted by Monitor Company.

105 United Technologies-Pratt & Whitney Canada (1990).

106 Interviews conducted by Monitor Company; and *Financial Post* (29 April 1991) 31.

107 *The Financial Post* (29 April 1991) 31.

108 National Advisory Board on Science and Technology, *Science, Technology, Innovation and National Prosperity: The Need for Canada to Change Course* (1991) 16.

109 National Advisory Board on Science and Technology, *Science, Technology, Innovation and National Prosperity: The Need for Canada to Change Course* (1991) 16.

110 IMD International and The World Economic Forum (1990) 219.

111 Statistics Canada, *Survey of Manufacturing Technologies* (1989).

112 Department of Industry, Science and Technology Canada, *Technology Survey of Canadian Firms* (1990) 1.

113 Porter (1990) 635.

114 Science Council of Canada, *Innovation and Intellectual Property Rights in Canada* (1990) 20.

115 This section draws on the discussion outlined in Department of Idustry, Science and Technology Canada, *Internal Report of the Working Group on Business Climate (Framework) Policies*, 12-16.

116 Consumer and Corporate Affairs Canada, Intellectual Property Review Branch (1990) 22.

117 Côté and Mauldin (1989) 397.

118 National Advisory Board on Science and Technology, *Report of the Committee on the Financing of Industrial Innovation (1990)*. Note: 1990 does not include France or Italy.

119 See, for example, Department of Finance (March 1991); and National Advisory Board on Science and Technology, *Report of the Committee on the Financing of Industrial Innovation* (1990).

120 Department of Finance (March 1991).

121 Canadian Federation of Independent Business (1988) 9.

122 Canadian Federation of Independent Business (1988) 9.

123 Jog (Spring 1988) 45.

124 Interviews conducted by Monitor Company with government officials in the respective provinces.

125 National Advisory Board on Science and Technology, *Science, Technology, Innovation and National Prosperity: The Need for Canada to Change Course* (1991) 12.

126 Government of Ontario, *Competing in the New Global Economy* (1988) Volume 1, 169.

127 Venture Economics (1990) Volume II, 18. The gap narrows somewhat for three-year projections, due mainly to lower Canadian sales projections.

128 Venture Economics (1990) Volume I. 18.

129 Department of Industry, Science and Technology Canada, *Small Business in the 1990s: Competing Through Growth* (1990).

130 According to the theory of Purchasing Power Parity, the real exchange rate of a currency can be derived by comparing the relative prices of a given basket of tradeable commodities in different countries, adjusted for inflation. For a discussion of the appropriate valuation of the Canadian dollar and its surprising strength in recent years, see the following: Royal Bank of Canada (1991); Harris (1991); Fortin (1990); and Laidler and Robson (1990).

131 In 1986, the U.S. Department of Commerce imposed a countervailing duty of 15 percent on softwood lumber imports from Canada. Most of this amount (14.5 percent) was attributed to provincial stumpage practices; the remaining 0.5 percent was attributed to various industrial programs. B.C. and Quebec subsequently negotiated full or partial removal of the tax through increased forestry charges to companies. In October 1991, the federal government abrogated the 1986 softwood lumber Memorandum of Understanding in opposition to the 15 percent duty.

[132] Advisory Council on Adjustment (1989) 113, 116.

[133] See Gaskell (1991) 75-78.

[134] Sarick (14 May 1991) A1.

[135] Thompson (1991).

[136] Bligh (1991) 2.

[137] Bligh (1991) 2. Recent initiatives by the Department of Fisheries and Oceans have suggested a shift in orientation. Specialized research institutes have been proposed for the west and east coasts, with significant private sector involvement and direction. However, both projects are still in the planning stages.

[138] Government of Canada, *Throne Speech* (1986).

[139] Department of Industry, Science and Technology Canada, *INNOVACTION: The Canadian Strategy for Science and Technology* (1989) 1.

[140] Conference Board of Canada, *International Competitiveness of Canadian R&D Tax Incentives: An Update* (1990).

[141] Canadian Space Agency (1991).

[142] Department of Industry, Science and Technology Canada and the three granting councils, *Program Backgrounder* (1989-1990).

[143] Stackhouse (July 1991) 45.

[144] *The Toronto Star* (20 September 1991) A18.

[145] Statistics Canada, *Science Statistics* (1989) Number 8, Table 7.

[146] Environment Canada's wastewater treatment laboratory in Burlington, Ontario, has been proposed for the pilot project.

[147] Report of the National Advisory Board on Science and Technology, *University Committee Report* (1988) 45.

[148] Data provided by the Department of Industry, Science and Technology Canada, S&T Economic Analysis Division.

[149] Association of Provincial Research Organizations and the B.C. Research Corporation staff, interviews conducted by Monitor Company.

150 Statistics Canada, *Science Statistics* (December 1990) Number 9, 3.

151 Savoie, *The Politics of Public Spending in Canada* (1990) 314.

152 Government of Canada, *de Havilland Sale Offering* (1985).

153 Department of Fisheries and Oceans (1990).

154 Fishery Products International, *Annual Report* (1990).

155 de Silva (1988).

NOTES

Chapter 7

1 IMD International and The World Economic Forum (1990) 124.

2 U.S. television stations accounted for 24 percent of total Canadian television viewing in 1988, according to the Bureau of Broadcast Measurement, Television Bureau.

3 *The Toronto Star* (3 June 1991) C1.

4 Group premiums accounted for 52 percent of policy face values in Canada in 1989 (not including annuities or health insurance) versus 41 percent in the U.S.; 26 percent in the U.K. (1987); and 30 percent in Japan. See Canadian Life and Health Insurance Association (1990); City Financial (1989); Japanese Institute of Life Insurance (1990).

5 Data from the Canadian Council of Better Business Bureaus.

6 Consumer and Corporate Affairs, Consumer Policy Framework Secretariat (1991) 10-13.

7 Hayes (1990-91) 46-51.

8 CAC is dependent on government funding; 57 percent of CAC's 1991 revenues came from government grants and project contributions, according to CAC financial statements, 1991.

9 International Atomic Energy Agency (1976).

10 See, for example, Lipset, (1990) Chapter 8.

11 Interviews conducted by Monitor Company.

12 Interviews conducted by Monitor Company.

13 Department of Industry, Science and Technology Canada, *Technology Survey of Canadian Firms* (1990) 1.

14 Porter (1990) 650.

15 Interviews conducted by Monitor Company.

16 Labour Canada, *Technology Impact Program* (1989).

17 Porter (1990) 92-97.

18 Interviews conducted by Monitor Company.

19 Government of Canada, *1990-91 Estimates, Part III: Expenditure Plan* (1990).

20 Statistics Canada, *The Public Sector Market Study, 1983* (1987).

21 Porter (1990) 644-47.

22 Bagnall (9 March 1987) 20.

23 Canadian Manufacturers' Association (CMA), *Interprovincial Trade* (1991) 7.

24 CMA, *Building a Competitive Foundation for Canada: A Blueprint for Removing Interprovincial Trade Barriers* (1988) 3.

25 CMA, *Interprovincial Trade* (1991) 4.

26 CMA, *Interprovincial Trade* (1991) 7.

27 Study Team on Government Procurement (1985) 186.

28 National Advisory Board on Science and Technology, *Report of the Government Procurement Committee* (1990).

29 See, for example, Government of Canada, *Canadian Annual Procurement Strategy* (1988); and National Advisory Board on Science and Technology, *Report of the Government Procurement Committee* (1990).

30 See, for example, Government of Ontario, *Competing in the New Global Economy (1988)* Volume I.

31 Eastern Canada realized reductions of 32 percent between 1980 and 1987. See Federal/Provincial Research and Monitoring Coordinating Committee (1990) 216. Between 1980 and 1990, total reductions were 40 percent of 1980 levels. See Government of Canada, *Canada's Green Plan* (1990) 120.

32 State of Massachussetts (1988).

33 United States, *Clean Water Act*, Section 307(A).

[34] Price Waterhouse, *Consumer Products Compliance Activities -- Objectives and Indicators Study* (1985).

NOTES

Chapter 8

1 Japan provides interesting indirect evidence of these likages. Japanese firms are known for close interaction with suppliers and rapid joint innovation. As Japanese firms have moved to foreign production, they have pressured Japanese suppliers to move with them. Even given the home relationship, firms prefer their suppliers to serve them from facilities in close geographic proximity rather than solely exporting from Japan.

2 Porter (1990) 140, 150.

3 Porter (1990) 101-102.

4 Studies by the Economic Council of Canada have documented and analyzed the slow pace of technology diffusion in Canada: *The Bottom Line: Technology, Trade and Income Growth* (1983) 56-57; and *Making Technology Work: Innovation and Jobs in Canada* (1987).

5 See Chapter 2 for a full statistical analysis of Canada's exports.

6 Solvell, Zander and Porter (1991) 76-85.

7 The forest product sector industry studies were market pulp, newsprint (see Chapter 4), pulp and paper equipment, and pre-fabricated housing.

8 In 1989, Canada had negative trade balances of US$13.5 million and $13.9 million in mineral sorting and crushing machinery respectively. Industries studied within the materials/metals cluster included nickel, aluminum smelting, geophysical contracting (see Chapter 4), consulting engineering and industrial explosives.

9 Varity Corporation official, interview conducted by Monitor Company.

10 This is consistent with Innis' Staples Theory of Canadian Economic Development where industrial and supporting and consumption goods were imported into Canada on backhaul transportation voyages. See, for example, Easterbrook and Watkins (1988).

11 Metallurgical technology developed by Sherritt Gordon and Inco has been licensed around the world: Dr. Walter Curlook, Inco; Dr. Dale Hull, Energy Mines & Resources, interviews conducted by Monitor Company.

12 Petroleum Services Association of Canada and the Independent Petroleum Association of Canada, Monitor Company interviews.

13 See Chapter 4, the Central Office Switch case study.

14 See Chapter 5, Figure 5.1 for an overall comparison of the determinants in the 25 industry studies.

15 For a concise survey of regional development policies see Bradfield (1988) 133–37.

16 Regional issues have always played, and continue to play, a significant role in the economic and political life of Canada, reflecting Canada's federal constitutional structure and the size and diversity of its geography. Regional development policy has been a formal part of federal government policy since the late 1950s, although the actual basis of such policies has often been unclear in practice. An extensive Canadian literature has developed on this subject and Canada has its own Institute for Research on Regional Development at the University of Moncton.

17 For a useful summary of federal–provincial issues see Savoie (1990) Chapter 11 and in particular 280–81.

18 Regional disparities measured in terms of per capita income per province. Economic Council of Canada, *From the Bottom Up: The Community Economic-Development Approach* (1990) 1. Bradfield (1988) also notes that "The intractability of regional disparities after 25 years and several billions of dollars of subsidies and concessions of all three levels of government could be taken as evidence of the futility of fighting market forces."

19 In particular see The Royal Commission of the Economic Union and Development Prospects for Canada, *Disparities and Interegional Adjustment* (1986).

20 Walker (1978). Courchene argues that Canada's transfer systems are not conducive to eliminating regional economic differentials and, in fact, blunt the necessity for less wealthy regions to make the adjustments required for them to remain economically viable. As a result, provinces have underpinned (with financial assistance from Ottawa) unrealistically high minimum wages which have contributed to higher unemployment levels and have deterred new business start-ups. In addition, generous UI benefits have reduced outward migration to more productive regions. See

Courchene (1978). These factors contribute to the difficulty of developing indigenous clusters in less developed regions. For critical evaluations of aspects of the Canadian Unemployment Insurance system, consult Daly and McCharles (1986); and Kaliski (1985).

21 See, for example, Savoie (1986) 38.

22 Atlantic Provinces Economic Council (1987)

23 Department of Regional Economic Expansion (1981).

24 Economic Council of Canada, *Living Together: A Study of Regional Disparities* (1977) 18.

25 Canadian Space Agency (1991).

26 Commentators have noted the role of government in the industry's uncompetitiveness. Inefficiencies at The Dominion Steel & Coal Corporation (DOSCO) were partly a result of "subsidies, subventions and modernization grants from the federal government to help make its product saleable on the Canadian market [such that] ... it was not keeping apace with developments elsewhere." Bickerton (1990) 196.

27 DEVCO eagerly entered into competition with other parts of Canada for footloose secondary industry. Between 1968 and 1971 it spent over $30 million with apparently little enduring benefit. "Many foreign-controlled assembly operations (General Instrument of Canada, Rand Electronics and Hustler Products of California), having received generous handouts from DEVCO, ceased operations only a short period after arriving"(Bickerton (1990) 249).

28 Government of Canada, *From Dependence to Enterprise* (1991) 107.

29 Young and Wiltshire (1990).

30 Statistics Canada, *National Income and Expenditure Accounts* (1989,1990) Tables 11 and 12. In 1971, total federal transfers to business totalled $733 million, while total provincial transfers amounted to $322 million. By 1990, federal transfers were $6,112 million while provincial transfers grew to $6,685 million. This amounts to a real compounded annual growth rate of 10.8 percent for the period 1971-1990 in the level of total provincial transfers to business.

31 Ontario Development Corporations (1989-1990).

[32] Michael St. Amant, Chief Operating Officer, Ontario Development Corporation; John Kemp-Welch, Investment Manager, Innovation Ontario Corporation; Dan Sherlock, Northern Ontario Development Corporation; R. Lindsey, Eastern Ontario Development Corporation; interviews conducted by Monitor Company.

[33] Rand (1986) 360-66; Bain (1988), 8.

[34] The Economic Council of Canada, *From the Bottom Up* (1990) 9-12.

[35] Some commentators reject defining regional policy goals in economic terms (for example, see Bradfield (1990) 138). The danger of not doing so is both a lack of emphasis on cluster development and a failure to recognize economic trade-offs explicitly.

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16 Price Waterhouse, *Individual Taxes, a Worldwide Summary* (1991) 51-52 (Canada) and 347-48 (United States).

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18 "Count of Agreements ratified between 1982 and 1990 with provisions for seniority in promotion," Government of Ontario, *Count of Agreements* (1991).

19 Example taken from Government of Ontario, *Transitions, the Report of the Social Assistance Review Committee* (1988) 259.

20 Government of Ontario, *Transitions, the Report of the Social Assistance Review Committee* (1988) 259.

21 Government of Ontario, *Transitions, the Report of the Social Assistance Review Committee* (1988) 260.

22 Statistics Canada, *Canadian Economic Observer* (April 1991), Table 10.7; U.S. Department of Commerce (May 1991) Table S-13. See also Daly and McCharles (1986); and Kaliski (1985).

23 Department of Employment and Immigration Canada, *Success in the Works* (1989) 3.

24 For critical evaluations of aspects of the Canadian Unemployment Insurance system, consult Daly and McCharles (1986); and Kaliski (1985).

25 Department of Employment and Immigration Canada, *Success in the Works* (1989) 3.

26 Department of Employment and Immigration, Press Release on Bill C-21 (1990).

27 Despite the fact that Canada's relatively young population has cushioned the impact of health care costs for the elderly, the country's health care bill has risen from 6.1 percent of GDP in 1966 ($3.9 billion) to 9.2 percent of GDP in 1990 ($60.3 billion): *The Toronto Star* (29 August 1991) A21.

28 OECD, *Economic Survey 1989-90* (1990) 74.

29 Government of Canada, *Canada Pension Plan, Eleventh Statutory Actuarial Report as at December 31, 1988* (1989) Table 1A, 7.

30 Lipset (1990) 126.

31 Department of Industry, Science and Technology Canada, *Canada's Business Culture* (1990) 7. The sources quoted are the Canadian Chamber of Commerce and sociologist Kaspar Naegele, respectively. In a contrary view based on recent survey data, Professor Joseph Fletcher of the University of Toronto argues that there are few differences between Canadian and American attitudes along the dimensions of risk-taking and entrepreneurialism. See Fletcher (1990).

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33 Courchene (1989) 35, 39.

34 Cleveland State University (1989) Table 3.9.

35 It is conceivable that industries in which Canada had poor productivity lobbied successfully for tariffs. However these tariff walls arose, the fact remains that Canadian industries have been strongly sheltered by the protection tariffs afforded.

36 Data is taken from Baldwin and Gorecki (1983) 20; and Economic Council of Canada, *Adjustment Policies for Trade Sensitive Industries* (1988) Table A-1. For further discussion of the impact of tariffs on industrial efficiency, see, for example, Eastman and Stykolt (1967); Baldwin and Gorecki, (1986)

37 Khemani, (1986) 153.

38 Khemani (1986) 153.

39 While identical comparisons are difficult to achieve, given potentially differing industry definitions, Canadian CR_4 ratios were found to be higher in approximately 70 percent of the industries examined. Source: Statistics Canada, and Australia Bureau of Statistics (1988).

40 Khemani, Shapiro and Stanbury (1988) 65-71.

41 Khemani (1986) 140-41.

42 Bureau of Competition Policy officials, interviews conducted by Monitor Company.

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46 The Royal Commission on the Economic Union and Development Prospects for Canada, Volume 3 (1985) 135.

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48 Example taken from documents provided to Monitor Company by ISTC on interprovincial trade barriers.

49 Monitor Company research.

50 See Baldwin and Gorecki (1991).

51 Organizations consulted included Statistics Canada, the Entrepreneurship and Small Business Office, the U.S. Small Business Administration, and Canadian Federation of Independent Business.

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53 Statistics Canada, *Employment Dynamics by Industry Division, 1978–1988* (1990) 1–13.

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55 Sharwood and Company (1989) 9.

56 Sharwood and Company (1989) 9.

57 Sharwood and Company (1989) 15.

58 Interviews conducted by Monitor Company.

59 Interviews conducted by Monitor Company.

60 McDougall (January 1991) 49.

61 Mueller (1990) 172.

62 See also Coyne (June 1991) 67–72.

63 In the first quarter of 1991, pre-tax profits as a percentage of national income fell to 4.39 percent, the lowest level since the Depression of the 1930s. See Ip (24 June 1991) 4.

64 Canadian data based on CANSIM data of Statistics Canada, *Industrial corporations, Financial Statistics* (various issues); U.S. data based on U.S. Department of Commerce, *Quarterly Financial Report* (various years).

65 Based on comparative data from Statistics Canada, *Industrial Corporations, Financial Statistics* (various years); and U.S. Department of Commerce, *Quarterly Financial Report* (various years). Government of Ontario, *Sectoral Sensitivity to Free Trade Study* (1988); Courchene (1989).

66 See Caves, Porter, Spence and Scott (1980). For further discussion of resource- driven "rents," see Copithorne (1979).

67 Ernst & Young, *A Preliminary Study of the Competitiveness of Distribution Channels* (1991) 32. An article by Hirst (October, 1991) 34, cites a recent comparative study of the Canadian and American retail environments. It concluded that "U.S. retail CEOs are older, probably wiser (they have significantly more education), and are generally more competitive than their Canadian counterparts." The study shows that U.S. managers are more 'achievement oriented', more apt to take risks, have a stronger work ethic and are generally more involved in their jobs. Canadian retailing, it seems, takes place in a kinder, gentler manner than in the U.S. If it's the Marquis of Queensbury rules in Canada, it's a bar room brawl in the U.S."; the study's author, Harry Lane says "... (indeed), the study shows that a competitive response to a new market entrant in the U.S. is to drive it out of business."

68 Khemani (1986) 156.

69 Khemani, Shapiro and Stanbury (1988) 26.

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71 Department of External Affairs senior officials, interviews conducted by Monitor Company.

72 Arthur Anderson & Co. (1989) 1.

73 Investment Canada senior officials, interviews conducted by Monitor Company.

74 Provincial government officials, interviews conducted by Monitor Company.

75 Canadian Exporters' Association senior officials, interviews conducted by Monitor Company.

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77 The two studies cited are Grant (1990); and Chenier and Prince (1990).

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79 Statistics provided by External Affairs Canada.

80 Report of the Advisory Council on Adjustment (1989) 103.

81 Department of External Affairs (1983) 153.

82 For a discussion of Canadian import barriers and import policy, see Salembier, Moroz and Stone (1987) especially Chapter 5.

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87 Brown (1991) 50.

88 Brown (1991) 50.

89 For a discussion of the increasingly global market for skilled human resources, see Johnston (1991) 115-27.

90 Grady (1989) 674-92.

91 The B Index is an all-around measure developed by the Conference Board of Canada that measures the ratio of the present value of project-related before tax income to the present value of project-related costs at which an R&D project becomes profitable for the firm that undertakes it.

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106 Office of Privatization and Regulatory Affairs, *Regulations, A Joint Venture in the 1990s* (1990) 4.

107 CMA, *Daring to Compete* (1990) 6.

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3 Canadian Auto Workers, *Statement on the Reorganization of Work* (1991).

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